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Original Contributions.

IS PAINLESS PULP EXTIRPATION IN EVERY CASE A POSSIBILITY?

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An accurate knowledge of the anatomy and histology of the dental pulp is quite an essential feature, if not an absolute necessity, in studying this most perplexing problem of its extirpation. It is, indeed, but a small portion of the human body, but you cannot know that portion until you have a more definite knowledge of the life function that it represents.

Equally interesting is its pathology, when diseased; and its removal under such circumstances is readily considered one of the most difficult operations the dentist is called upon to perform.

Early in life the vascular tissue of the pulp is far in excess of the nerve tissue, while in old age quite the reverse is true. When inflamed, there is a decided determination of blood to the part; the blood vessels become enlarged to make more room for the excessive amount of blood. On account of their peculiar situation, surrounded by unyielding walls, this expansion takes place at the expense of other tissues.

What are some of the changes that take place in nervous tissue? Competent authorities claim that the central nervous system is the first to fail in consequence of the cessation of circulation, while nerve trunks retain their vitality for a long time, even when excised.

Careful investigation on the part of physiologists has proven the indefatigability of nerves. Nerve fibers are thus remarkable in being so differentiated as to be unaffected by repeated activity, and they offer a striking contrast in this respect to other parts of the nervous system or their neuromuscular connections.

These statements have reference to motor medullated nerve

fibers, and on general grounds it may be assumed as probable that afferent or sensory nerve fibers possess the same properties.

It is common knowledge that the blood supply is essential for the maintenance in their normal condition of the living structure of higher animals, and that the failure of vital activity in consequence of its cessation is more rapidly produced in warm than in cold blooded animals. According to the statements made in regard to the indefatigability of nerve fibers it is to be expected that they should offer a very considerable resistance to functional failure, in consequence of the arrest of the circulation, their metabolism being such as to require but little assistance from extraneous sources.

It has been fully established that, if certain other injurious effects, such as loss of water through drying, temperature changes, etc., are avoided, the medullated fibers of a nerve trunk maintain their vitality for many hours after the circulation has ceased.

This brief statement in regard to the peculiar nature of nerve fiber may, in a measure at least, account for the difficulty encountered in some phases of pulp extirpation.

At the present time this operation is one that can be executed by the average dentist with little or no pain, in the majority of cases at least. There are, however, pulps under certain peculiar conditions that are not so easily extirpated. In the attempt to use cocain in any of its forms and by different methods we find that, after repeated trials, the pulp appears to be as sensitive as ever. The same experience obtains in the application of arsenic trioxid.

In our afternoon clinics at the dental department of the University of Michigan we have the best opportunity that may be had for observing this most peculiar phenomenon. Student after student will report to us that they have used this or that method repeatedly with little or no effect.

Such failures are frequently due to lack of experience and perseverance, because we have often been able to secure the desired results in just such cases.

Occasionally, however, we have not been quite so fortunate. After repeated trials with various solutions of cocain hydro-

chlorid, using both high and low pressure methods, or by injecting directly into the pulp, we find the same sensitive condition as when we started.

I have in those cases even tried the method which may be familiar to some of you, of injecting the solution directly into the pericemental membrane, but the results were far from being satisfactory.

In just one case do I remember being successful in removing a highly inflamed pulp by this method; but the cocain had such a serious effect upon the vitality of the membrane that we lost the tooth in spite of all that we could do to save it. In such cases this organ already suffers from a disturbed circulation and the poisonous effect of the drug lowers its vitality to a degree from which it is unable to recover.

To one case in particular do I wish to invite your attention. It was an upper first bicuspid, with pulp exposed, and one that had given the usual amount of discomfort. I tried for at least two hours by different methods and means to anesthetize that pulp, but was unable, apparently, to make the slightest impression. An application of arsenic trioxid gave no better result. As a last resort I tried the method by cataphoresis, but the operation was a complete failure. The operation was finally completed at a future sitting by the use of a general anesthetic.

To the treatment of such difficult cases it is that I wish to call your particular attention—to those having pulp stones, or which have been exposed some time, with perhaps an existing chronic inflammation, and especially to such as have been irritated for a long time with a large metallic filling. All such cases, you are well aware, are trying to both operator and patient.

Various reasons have been suggested from time to time to account for the failures in these cases. Is it because we do not understand the peculiar pathologic condition which obtains in such pulps? Or is it lack of skill and patience, or faulty technique on the part of the operator? Or may it not be due to an impure sample of the drug or vehicle used? Some authorities claim that idiosyncrasy is quite an important factor to be considered and one that is very readily overlooked.

All these are questions which ought to engage our most careful

consideration and study. To find out, if possible, whether peculiar pathologic conditions, idiosyncrasy, faulty technique, impure or improper solutions, or lack of skill and patience are all factors of equal importance in dealing with this proposition, and to solve by means of practical cases such difficult and perplexing problems in our afternoon clinics, has been the major part of my work for the past four or five years.

As stated in a previous part of this paper, we have frequently been successful in these operations for pulp removal when the

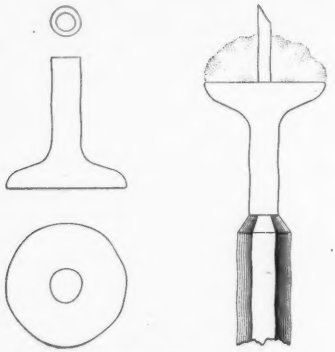

Fig. 1. Gem Syringe Attachment.

student has failed, and this has often served as a clue in pointing out where the real difficulty lay.

Just what the pathologic condition is in these refractory cases, I have thus far been unable to ascertain; nor is there any literature upon the subject that offers a satisfactory explanation.

From my limited experience I am inclined to believe that pathologic condition and idiosyncrasy are not to be considered as insurmountable barriers in making this operation a success.

The most important factor to be considered, in my humble opinion, is the operator himself. Most of these so-called hopeless cases are found in the mouths of nervous patients. Not infrequently we come in contact with people who have no control over themselves. They want the best that is to be had, but will not stand the slightest amount of pain. What shall we do with these cases? Shall we treat them temporarily and patch them up as best we can and send them to our fellow practitioner, or

shall we continue to work for them and give them our best service?

To control these patients we must first learn to control ourselves, and in case we cannot do that we had better dismiss them. Is it our duty, let me ask, to undertake such difficult operations at the expense of great nerve force and with results that have thus far only proven to be unsatisfactory?

Here is a point where the dentist must show his color. First of all, he must learn to control himself under any and all circum-

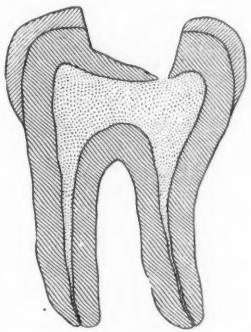

Fig. II. Exposed Pulp; Lower Second Molar.

stances. To be able to successfully combine such qualifications as gentleness and firmness is by no means a small accomplishment; yet without these a favorable outcome cannot be realized.

I fear that some of these statements are irrelevant to the subject under discussion, but a little digression makes a contrast, and in some cases and with some speakers it is an absolute necessity to keep up the interest.

During the past two months I have obtained some excellent results by means of Dr. Middaugh's Gem syringe attachment (Fig. 1). This is an attachment that may be fitted to any hypodermic needle, and by using some unvulcanized rubber the cocain solution can be forced into the pulp tissue with less pain and more effectively than in any other way. This method is especially effective in those cases in which, for some reason or another, portions or remnants of the pulp have not been removed. Care,

however, must be exercised so as not to force too much of the cocain solution into the apical space.

I candidly believe that, with methods heretofore used, failure is often due to the fact that the solution does not reach its desired destination. This device does not afford an easy application in those cases in which the cavity and pulp exposure are in locations that are more or less inaccessible. I am obliged to confess that in such cases I have failed repeatedly with the Gem syringe

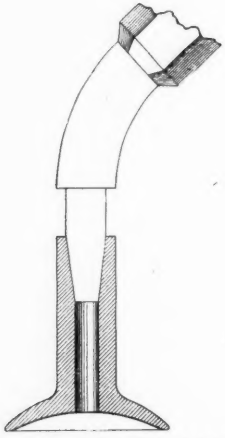

Fig. III. High-pressure Point Fitted into Attachment.

attachment. The difficulty seemed to be in getting a good contact, so as to force the solution into the tissue as desired.

This phase of the problem, however, has finally been solved. I have devised an attachment of different sizes and shapes (as shown in Figs. III and IV) that may be placed into the cavity over the exposure and cemented into place.

When the cement has hardened sufficiently the cocain solution may be forced to its destination in the usual way.

The results obtained in a number of almost hopeless cases have been very gratifying, to say the least.

Since the advent of the ether spray apparatus the number of absolute failures may be still more reduced. I have not given it a sufficient trial in connection with this kind of work to put myself on record. However, I can see no reason why it may

not be employed in some of these cases to effect an exposure and then complete the operation by means of cocain hydrochlorid.

As hinted at in the first part of my paper, in many of these cases the circulation has been seriously impaired, the solution is not readily absorbed and the nerve fibers retain irritability and conductivity even for hours after the circulation has ceased.

In conclusion, I will venture to predict that in the near

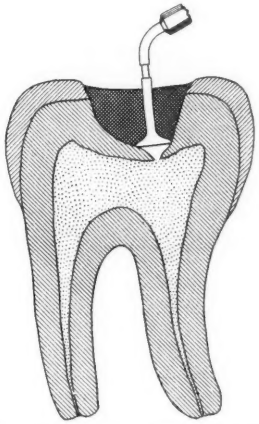

Fig. IV. Attachment Cemented in Place.

future expert pulp extirpation will be one of the specialties of dentistry. The operator who is able to give his undivided attention to this kind of work will be sought as eagerly as he who devotes his time exclusively to the correction of malocclusions. His services are just as important and the responsibility just as great as he who confines his work to any other branch of dental practice.

How may we become skilful or even experts in this branch? Mechanical skill and trained fingers are not to be found by confining training to books.

Practice with thoughtful intelligence back of it will bring results. However, an individual possessing a mind with such attributes will be an honor to the profession, provided his previous education has been broad and liberal and not purely practical.

Finally, let us bear in mind that it is not the operator but the

patient who is continually looking for painless methods. Do you wonder at the success of the so-called painless dentists? For some time it has been my good fortune to see hundreds of patients who were especially looking for pain-relieving methods. This service cannot be dispensed by the average student. No method, no instrument will accomplish its work without having intelligence back of it.

I think it was Robert Louis Stevenson who said, "People are afraid of war, wounds and dentists, and for very good reasons." To my mind, at least, the greatest problem before the profession today is the annihilation of pain in cavity preparation and pulp extirpation, and I sincerely believe a practical solution is near at hand.

THE COMMON GROUND OF MEDICINE AND DENTISTRY.

BY F. L. FOSSUME, D.D.S., NEW YORK CITY. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, JUNE, 1907, AND REPRINTED BY COURTESY OF THE JOURNAL OF THE ASSOCIATION.

The divorce of dentistry from medicine, before the days when specialism was recognized as a necessity, has resulted in placing those diseases classified under stomatology in a peculiar position. The clinical aspects of these diseases are observed, for the main part, by the dentist. The etiology and pathology remain mainly with the physician or those who are fortunate enough to combine the degrees of M.D. and D.D.S.

Different curricula and training tend to keep the professions apart. Concurrent interests should weld them together, and it is with a plea for a clear conception and interpretation of these interests in the broadest sense that I lay before you this paper.

Before entering into the detailed elaboration of the conditions which the physician and dentist should and must fight together, it is of the greatest interest to note that in England and continental Europe the professions are working much more closely together. At the time when the opsonic index, its meaning and importance, was as Greek to the American dentist, his English brother was

confirming the work of Dr. Talbot, basing his findings on what seem to be the conclusive and scientific methods of Wright. It cannot be, surely, that the ever, and rightly, vaunted superior mechanical skill of the dental profession in America is to forever keep him classified as a mechanic.

Let us who are dentists burn at least part of our bridges and cease putting too much trust in gold, and begin to regard our profession solely as the most important specialty of medicine, a specialty to be based on a thorough knowledge of physiology, histology, pathology, human and comparative anatomy and allied subjects. If the degree of M.D. is lacking, let us fill in the want by post-graduate courses. Let us be in a position at least to interpret along broad scientific lines the etiology and pathology of those conditions met in the mouth.

Hospital Recognition of Dentistry.—All the faults, however, which lie at the bottom of the passive schism between medicine and dentistry must not be laid to the dentist. What is to be thought of the large New York hospitals without an active dental visiting staff? One need not, of necessity, be an explicit follower of Hunter to give the patient suffering from pernicious anemia the benefit of an off-chance in the etiology and treatment of the disease, especially in cases in which the mouth is one mass of rottenness; and yet such is not the custom of New York town.

Hospitals and hospital practice have been the main factors producing that which is best in medicine, and never can dentistry hope to achieve a scientific and sure basis until it leaves aside its perpetual pulling of teeth and filling of cavities, its inertia toward scientific investigation, its petty state politics, and, entering into the fight, forces the physician to its recognition by superior and well-founded methods of diagnosis, prognosis and treatment. It is only by an accumulated experience that the dentist can hope to occupy and to maintain his share of the common ground, and this experience can be obtained, under the present dispensation, only by perfecting the knowledge pertaining to stomatology, so that it may become a necessity to medicine in its broadest sense.

Early Recognition by the Dentist of Systemic Disease.—It seems but logical to me to divide the common grounds of medi-

cine and dentistry into two parts, based on the clinical manifestations of the diseases as met with in stomatology, first taking up the diseases which are manifested especially in the mouth, the discovery of which means that the dentist should automatically refer the patient back to his physician for treatment and consultation.

Here we immediately strike one of the difficulties which inhibit a free interchange of courtesies and consultations, a difference in diagnosis leading to at least an irritation between the physician and dentist. An excellent example occurred in my own practice during the writing of this paper. Mr. S., 58 years old, consulted me as regards "saving his teeth." I found a lack of tonicity present in the alveolar processes to a moderate degree, together with marked pyorrhea alveolaris. Following my usual routine, I had his urine examined and 0.75 per cent of sugar was found. I mailed the report of the urinalysis to his family physician with a request that Mr. S. be kept under observation and treatment, in order that the best results might be obtained from the dental work which was being done. The family physician informed me that the quantity of sugar was not to be regarded as pathologic, and did not institute any form of treatment. The ethics of a situation like this is clean-cut. The expediency of the resultant course is somewhat blurred, as the patient in the above case cannot gain satisfactory results while suffering from a lowered resistance, due to what I believe to be a low grade, slowly progressing case of diabetes.

The second division of the common ground is made up of those cases where the highly specialized knowledge of the dentist should make him the natural consultant of the physician trying to unravel some of the many obscure conditions which confront him, obscure particularly in etiology.

Taking up in detail the first division which I have made, we may further subdivide these conditions into poisonings and systemic diseases, where the mouth first shows the clinical picture and keynote of the diagnosis.

To the classical poisonings of lead and mercury from therapeutic or trade sources may be added those of copper, silver, phosphorus, and the less often recognized iodin and bromid poisonings

or saturations. And here let me emphasize the absurdity of undertaking extensive dental operations while the patient is on even small doses of bromids. Not infrequently patients are referred to me on account of acute subjective symptoms, carrying in their pockets prescriptions containing bromids, "something to quiet them until they get relief at the hands of the dentist." It is impossible to get ideal results in a patient whose physician is thus tiding over the strain incidental to, or the cause of, extensive dental operations. I believe this to be true in spite of the fact that many of the best men in the profession are advocating bromids as a routine treatment when the patient shows the effect of nervous strain during prolonged dental work.

The mouth, it would seem, is particularly sensitive to systemic diatheses and diseases. Rheumatism, gout, diabetes, Bright's disease, syphilis, less often tuberculosis, and many other diseases, will often show themselves there first, and the dentist, if he is a good diagnostician, may read the diagnosis plainly long before the subjective symptoms would force the average patient to consult a physician.

Time after time have I appealed to the physician to aid me by building up the general resistance of his patients when the condition of the mouth was either the immediate or the predisposing cause of a series of obscure symptoms involving the digestion immediately, and, more remotely, the entire body. Time after time have I seen the patient receive nothing more extensive than a few kind words about "a malarial tendency" or "a little anemia," together with a few Blaud's pills or an empirical iron, quinin and strychnin mixture. Before these conditions can be changed entirely, perhaps a more general scientific, diagnostic and therapeutic medicine must be practiced. In the meantime I would make a plea for the recognition of the fact that a diagnosis made from observations based on the condition of the patient's mouth may be a scientific one and is not to be discarded because made by a dentist. Let the physician recognize that the mouth is often the keystone of diagnosis and that the dentist, if he is an observer, must acquire clinical experience in using the mouth as such.

It is but right to say that within the last five years I have

noticed a great change in the attitude of the medical profession as regards courtesy in weighing a suggestion.

Without taking up in detail the local effects, as shown in the mouth, of the various systemic diseases and poisonings, I would make a special appeal for the sure and conservative recognition of syphilis, whether in its primary or secondary stage. This is especially the case where a negative diagnosis is the correct one. The following case at present under my care will illustrate exactly what I mean:

CASE.—Mrs. X., 20 years old, while being treated for incipient pyorrhea alveolaris, developed a suspicious chancre-like sore on the base of her left tonsil. Her physician, after some difficulty, got a history of possible exposure (innocent). After observations of a few days he made a diagnosis of a primary syphilitic infection of the throat. Fortunately, I was interested in seeing whether the *Spirochæta pallida* was present, and with his permission I had a number of cultures and smears made. The report, coming within a few hours, cleared up the situation. The smears showed numerous bacilli present, and for the most part these were the bacillus of Vincent.

I believe that there are many more cases of concurrent throat complications during dental operations than one would gather from literature. These complications, while in part due to faulty technic, are, I think, in the main part due to the common rheumatic etiology of tonsillitis and dental conditions, such as pyorrhea alveolaris.

The conditions which make up the second division of the common ground for the dental and medical professions will naturally vary, as the mental and technical equipment of the individual; the rhinologist and laryngologist and the specialist in orthodontia have much in common that can not especially appeal to the busy family physician and the dentist buried in bridge work. But this may be said, that in every man's practice cases often occur where the specialized knowledge of the dentist will solve some of the problems of treatment. The obscure stomach cases, the cases of facial neuralgia, the adenoid face that has not yielded to removal of organs, these and many more every-day problems are part of the common ground.

To take up some of the aspects of the condition common to

all mankind, here surely has the physician had full control for centuries, and to-day it is interesting to get the ideas of a body of physicians as to whether the disorders commonly associated with first dentition are physiologic or to be regarded as a relic of the dark ages, with "milk fever."

The Development of the Oral Cavity.—Without entering into a prolonged discussion as regards the embryologic development and the evolution of the digestive tract in the infant, some of the common-sense factors in the building up of the oral cavity and its boundaries in early life may be mentioned. The alveoli especially are pliant in the baby, and the two main factors in their molding are undoubtedly the tongue and the lips. Physiologically, the natural exercise of the infant is sucking. In the bottle-fed child this process is either eliminated entirely or reduced to a minimum. I believe that a bottle-fed child, *per se,* lays the foundation for a high palate and all the evils associated with mouth breathing. True, hereditary tendencies and other factors may abort these evils, but the child who has been suckled through a rubber teat, other things being equal, has much more chance of ultimately coming under the care of the laryngologist than one whose mouth is formed by the natural process of suckling—working more or less for its daily milk.

Passing rapidly to the first permanent molars, there is no doubt as to the occasional reflex disturbance caused between the fifth and sixth years by these teeth. In obscure cases of convulsions, after the possibilities of intestinal parasites and circumcision have been considered, it is well to look at the mouth to ascertain whether the real source of the reflex trouble is not there. At this stage, too, there is considerable tendency to decay, and I have found that potassium sulphocyanid is a constant accompaniment of decayed teeth. It would seem but fair to conclude that the continual swallowing of cyanids, even in the small quantities of 0.075 parts per thousand, is not for the good of the child.

The complications accompanying the eruption of the third molar teeth are too well known to emphasize especially, as here, fortunately, the subjective symptoms make the diagnosis so that he who runs may read. Brunto has well summed up the possi-

ble effects of bacterial infection, having for its origin the oral cavity:

1. "Carious teeth mean imperfect mastication; consequently increased and unnecessary work for the stomach, this in course of time leading to the various ills connected with impaired digestion. Such a mechanical relation I consider by no means the only, or even the most important, relation of dental disease to general health."

2. Dental disease as a cause of ill health in consequence of being a continued source of poisoning and septic infection, both local and general.

Constitutional Effects of Tooth Cavities.—Without advocating a dogmatic view in regard to any of these explanations, it seems rational to allow that a cavity in a tooth fulfills many of the requisites of an ideal incubator, and that the swallowing of large quantities of bacteria must be detrimental to digestion. In pyorrhea alveolaris, a disease but little recognized by the medical world, we confront not only a series of abscesses such as the surgeon would not allow to exist in any other part of the body, but there is the perpetual swallowing of bacteria. This, together with the fact that the patient will sooner or later lose all the teeth affected, gives a trail of evils and discomfort which should command a more active recognition of this condition by the physician, active in the selection of a dentist who he knows is able to cope with the conditions. There is no more excuse for a physician referring a patient to a dentist of whose work he is uncertain than there would be for the haphazard selection of a surgeon for consultation. The patient in both cases is entitled to the best counsel of which his physician knows.

At this time, when the yearly outbreak of typhoid is confronting the physician, it will not be wrong, I think, to call his attention to the benefits of having a dentist thoroughly scale and clean the teeth during the progress of the disease. This can be done without putting extra strain on the patient, and the results gained by careful cleaning of the teeth, in the case of a milk diet, are wonderful.

The care of the mouth in children, especially in school children, has been threshed time and again and the merits of inspection and treatment agreed on. This point, however, should be recog-

nized. The physician practically controls everything in respect to the health of school children, and only by a campaign to awaken the interest of the medical world in preventive dentistry can a foothold be obtained throughout the country, which will enable the dentist to devote his best efforts toward saving the teeth of those children who would otherwise suffer from lack of dental care.

The Relation of Orthodontia.—The relation of orthodontia to rhinology and laryngology is of the greatest interest to those who are at present thinking along these lines, and I have no theory that has not been given before. Hilton in 1855 gave a rational explanation of the functions of the individual parts of the cranium. The main facts are plain. It really does not matter, so far as the rationale of technic is concerned, whether the deformities of the nose, especially the septum, are dependent on malformation of the palate and maxillary bone, or vice versa. The final result is the same; the mouth breather is a mouth breather. The condition is associated with the farthest reaching evils with which a dentist has to deal. The malocclusion is there, and no removal of adenoids, however satisfactory, will ever properly space the teeth, and without proper spacing of teeth there is no development of a normal cranium. It may seem at present visionary, but I believe that the time is near at hand when no adenoid operation will be undertaken by the rhinologist abreast of the times without provision being made for the after-care of the malocclusion, which is present in all cases of mouth breathing. The correction of the dental arches, the spreading of the maxillary bones, the establishment of correct relations between the mandible and the superior maxillary bone, must be carried on with the same regularity as the treatment for hare-lip.

One more condition which lies in the common ground must be spoken of, and that is, the frequent and most distressing neuralgia. The symptoms and effects of neuralgia, especially of facial neuralgia, its treatment and prevention, have been worked over by some of the most brilliant surgeons, the work of Dr. Hartley in this matter being one of the classical contributions to American surgery, but there are innumerable cases which come into the hands of the dentist after the surgeon has tried every means of

alleviating the pain. And it is well worth while to cover rapidly the etiology from the dentist's point of view. Impingement of the pericemental membrane by tartar and subsequent infection, pulp stones or secondary deposits within the pulp and root canals, malposed, non-erupted teeth, imperfect technic in bridge and crown work, all are causes of neuralgia. The diagnosis is sometimes obscure, and in such cases the Roentgen ray often aids, and almost ideal results are obtained by Roentgen ray stereograms, as done by Dr. Caldwell of New York. Here we have the third dimension preserved in the films, and the more exact locating of a foreign body or pus being useful. In cases of stubborn facial neuralgia the dentist always should be consulted, not that he can always help, but in a considerable number of cases he may throw some new light.

Conclusions.—To summarize, the points I have endeavored to make, and which I believe must be recognized before there is any undisputed common ground for the physician to work on: The dentist must appreciate the fact that the mouth is a part of the whole body, an important part, but only a part. He must think in terms of interchangeable scientific expressions of thought, so that his findings, observations and deductions are easily interpreted by the physician. He must keep pace with the best in medicine, for only those physicians who stand for what is best in medicine can and will appreciate what is best in dentistry. The mediocre man in either profession will, of necessity, stick to his own particular last, but if the dentist will record and read his daily findings correctly he will find that his experience must more and more elucidate some of these problems of medicine, his work will be of double interest to himself and he will open up fields hitherto unknown.

The physician, on his part, must recognize that the mouth as a seat of disease is often overlooked, and that the logical consultant in many cases is the dentist, who, by virtue of his constant clinical experience of the normal in the mouth and teeth, must acquire the knowledge that is necessary for the unraveling of symptoms pointing to the mouth as a seat of trouble. I recognize that it is unfortunate that all dentists are not physicians, but this is a misfortune for which the patients should not be made to

suffer, as suffer they often do because of the lack of appreciation by the dentist of the fact that the local conditions he is coping with are but manifestations of a systemic trouble, or because the physician does not realize that the science of dentistry involves more than a mere stopping of holes or pulling of teeth.

Let the physician choose his consulting dentist with the same care that he does his consulting surgeon—with more care if possible—for all his patients will have to visit a dentist, while only a small proportion will need surgical intervention. Let him keep abreast to a small extent of dental literature, not necessarily the most technical, but the general literature. Let the dentist think and work in terms scientifically interchangeable with the physician; then, and then only, will the common ground need no defining.

DISCUSSION.—*Dr. Francis A. Faught,* Philadelphia, agreed that the specialties of medicine should include dentistry, but, he said, all the specialties of medicine should, in a way, be specialties of dentistry, because one cannot get away from the diseases of the nervous system, the stomach and nose in relation to the teeth. He has been impressed with the failure of dentists, as a rule, to report findings and subsequent observations on cases. There is a lack of information, and some statements are absolutely erroneous. Dr. Faught felt that because of the relation of dentistry to medicine one should have better training in diagnosis, especially in relation to the heart, and the giving of anesthetics. It is important that the condition of the heart and of the internal organs should be known, and that the giving of an anesthetic, where such a thing is contraindicated, should not be done by the dentist. The same may be said of the kidneys. The dentist should do this for his own protection, if for nothing else. In regard to the question of dietetics and hygiene in the treatment of diseases of the mouth, not so much of caries as of inflammatory conditions, an adequate working knowledge of the excretions and secretions, particularly of the saliva and urine, becomes important.

Dr. H. C. Register, Philadelphia, said that in a number of cases the importance has been strongly impressed on him of the necessity of early diagnosis of many pathologic conditions of the mouth that opportunely come under the observation of the dentist or stomatologist and that otherwise would be lost sight of

until a condition had been reached that would probably terminate in death. Dr. Register referred especially to carcinoma. He has diagnosed the presence of carcinoma very early, when it was yet a local condition, before metastasis was developed. While it was in a local condition its removal was favorable to a complete cure. In one case a fibrous tumor developed itself at the angle of the mandible. It had been removed by a general surgeon three times. The patient presented himself to Dr. Register, thinking that something in connection with the teeth might be the cause. Dr. Register found that the third molar was devitalized and in a putrescent state, and on opening into the pulp chamber he soon established that the tumor originated from that cause. In diagnosing these cases of fibrous tumors, Dr. Register has received much assistance through the use of compressed air. After washing out the tracts germicidally, he applies sterilized air under pressure, and if the air follows the tracts one can soon ascertain whether they are associated with a devitalized condition of the teeth. On several occasions Dr. Register has shown that these fibrous tumors originate from devitalized teeth and succeeded in diagnosing them very quickly in this way. He operated in this case and the tumor gradually dwindled away and dried up by the correction of the toxic condition of the tooth and the surrounding tissues of the jaw. As to the mechanical side of dentistry, Dr. Register stated that he could not see that there is any difference between the mechanics of dentistry or stomatology and the mechanics of every specialty in medicine or general surgery. The general and special surgeon must use mechanical assistance. He uses it, not *per se,* but as a means to an end. In dentistry it is used for the same purpose. The application of mechanical devices used in surgery is unlimited. The very first example of mechanics used in surgery, he continued, was given by John Hunter, who, unfortunately, tore the Achilles tendon of one of his feet, and he was a lame man for quite a while. It was through an accident that Hunter brought about, by means of mechanics, one of the best things for the cure of club-foot known today. The cure of injuries of the spinal column could not be effected without the surgical mechanical treatment. And so, he said, it is in all departments of medicine. Mechanics are constantly used by the general surgeon and by specialists in other branches as

well as in dentistry. The trouble with dentistry, he continued, is overregard for mechanics. It is not so much that dentists use mechanics as a means to an end, but they make it the end itself. That is one of the great mistakes they make. In Dr. Register's opinion the fields of dentistry and medicine are one, and the purpose of one so thoroughly includes the purpose of the other that he cannot see how men who want to be broad in their ideas and who expect to do the best for their patients can do otherwise than accept the doctrine that medicine alone is the only means by which the highest efforts of dentistry are to be accomplished.

Dr. James E. Power, Providence, R. I., believes that every practitioner of dentistry should possess a medical education, but not necessarily a degree in medicine. He should possess a thorough knowledge of that medicine which pertains to the intelligent practice of dentistry. The course of instruction necessary for the degree of medicine would broaden the mind of the individual, but not any more than would the courses required of the candidate for the bachelor of arts degree. The better a man's education may be, the greater is his power and ability to accomplish the transformation of energy. Dr. Power thought that Dr. Fossume fixed a standard of education, maintaining that if a patient is placed in the hands of a dentist of the type considered he would be entirely safe, and if the disease should travel into the realms of pathology with which the dentist is not familiar, he would, at least, be sufficiently familiar with the fundamental principles of general pathology to recognize conditions as they arose and call a consultant. Thus his relation to his patient would be perfectly honorable, and he would be justly considered a valuable member of his profession. Dr. Power believes that dentists are taken at their own estimate. They fix the standard of the profession. If they place a low estimate on dentistry the public and the medical profession will take them at that estimate. He regards proper preliminary education as of the greatest importance in that connection. There is no better way, he said, of teaching the public and the medical profession the importance of dentistry as a profession than by requiring that the education of the candidates for the dental degree be raised. Dr. Power feared that the mission of a college sometimes is misinterpreted. The mission of every

professional school, he thought, consists in giving to a graduate the least possible amount of knowledge that can be possessed, in order that he may be allowed to practice with safety to the public. One lifetime is too short for a dental or a medical school even to pretend to familiarize a man with every form of disease he may be called upon to treat in future years. The diploma represents the acquisition of the fundamentals on which the knowledge of dentistry is based. When dentists look at the matter in that light, when they will see things as they really are, the elevation of dentistry as a profession will commence, and dentists will be in a position to demand the recognition which they are now seeking. In conclusion, Dr. Power referred to the mission of the profession itself. He believes that dentists should exercise the greatest care and practice along scientific lines. They should realize that they have reciprocal obligations to each other, and that the whole profession is affected by the words and actions of the individual. They should do everything they can to assist in its elevation. Professional ethics, social bearing and high moral culture will do most for dentistry, most for humanity, and impress the medical profession, the public, and all concerned with the facts that the dental profession deserves proper recognition.

Dr. James McManus, Hartford, Conn., called attention to the fact that of the 35,000 dentists in the country, a large proportion of whom are college graduates, only a few are members of the Section on Stomatology. He does not believe that dental colleges are as poor as some say they are. He believes that every dental college in the country graduates each year men who are the equal, in their line, of any medical graduates, and that, as a rule, the dental graduate is better fitted to go out and practice his profession than is the medical graduate. His fingers are educated, his opportunities in clinics are greater, and when it comes to the use of anesthetics he has a practical knowledge that the average young medical student does not have. What is the trouble? he asked. When the dental graduate goes out to practice he stops right there; he does not seem to study. There seems but little desire to take any interest in society work or even in the profession itself beyond the limits of his own practice. Nor do dentists buy books. Dr. McManus thought that the trouble with the dentists has been that when they got where they were legally al-

lowed to practice, they joined this organization and that organization, and then spent their money for almost every cause except the cause of dentistry. Dentistry, as a majority of dentists practice it, is a calling. A few dentists are professional men, and some of these have the degree of M.D. Those who have not this degree, Dr. McManus believes, are as good professional men as are those who have it. The dental graduate, he said, is well educated, or at least he has the opportunity to get a good education, for most every dental college gives that, and it is his own fault if, after he leaves college, he does not become better educated.

Dr. Truman W. Brophy, Chicago, thought that the reference made to the shortcomings of the schools of medicine, regarding their failure to teach many of the diseases and injuries of the oral cavity, is generally recognized, but he urged that the matter be taken up in the Section on Medicine, where it properly belongs. He felt that the trend of the papers and of the general discussion suggested that the word mechanics is an objectionable one, and that it should not be given the weight and consideration that it is receiving by dental colleges and dentists generally. It must be remembered, however, he said, that among the greatest men the world has produced have been those who attracted attention, not only by their genius, but also by their digital skill. Men such as Michael Angelo and Thorwaldsen were mechanics, therefore dentists must not forget the achievements and the possibilities of the mechanical side of their profession. Dr. Brophy agreed with Dr. McManus that what is needed are men of education in dentistry. A man will stand for exactly what he is worth. If he is cultured, if he has education, if he has capacity, such qualities will be recognized always. It does not make any difference what titles a man has; he will be recognized for what he knows and what he is able to do. As to dentists, they need not appeal to the medical profession for recognition.

Dr. F. L. Fossume, New York City, emphasized the necessity of the dentist fortifying himself with a knowledge of pathology and histology, so that he can discuss all dental lesions in terms acceptable to medical men. Every man, he said, will get the recognition he deserves if he works, and if he pays attention to the opportunities that are offered of practicing dentistry on a

high plane and according to a high standard. He believes that stomatology can stand alone and that the dental profession is insufficiently educated in pathology and histology. The cases that do not yield to treatment, those with lesions around the teeth and their sockets, are almost analogous to cases of gallstones which are treated therapeutically. Every physician, failing to secure results, will immediately proceed to examine the patient's urine, and thus arrive at a safe conclusion as to the etiologic causes of the disease and the reason for his failures. The ordinary dentist, practicing dentistry more or less mechanically and using only the fundamental principles of dentistry, is not doing justice to his patients when he fails to go a little deeper into the causes than merely to say, "This case is incurable." Dr. Fossume thought that if the Section on Stomatology could unite with some other section it would be a great education for dentists and a grand opportunity to put the entering wedge into the collateral profession and gain its respect and confidence. Physicians do not realize what dentistry of today is. Modern dentistry is as different from what it was in its fundamental principles as any of the other sciences are in their fundamental principles, which is due to scientific research work, done by men who have devoted their time and their money to research along necessary lines.

OBSERVATIONS IN PRACTICE CONCERNING THE CASTING OF GOLD.

BY R. B. TULLER, D.D.S., CHICAGO.

There are but few dentists, probably, in the country who, since Dr. W. H. Taggart demonstrated the feasibility, have not undertaken to make cast gold inlays; and especially since, by the steam process of producing pressure, nothing is required but what may be easily and inexpensively acquired or improvised.

Some seem to have grasped the entire technic, from taking the impression to forcing the gold successfully into the mold; and some have had *some successes* and many failures—failures, sometimes, at the most inopportune moment, with *incipient* confidence in the system getting a severe setback. Some have failed entirely, and even with the most perfect method and outfit to be had, and are waiting until the scheme develops and grows easier.

If anyone has an idea that the making of wax models and casting gold is an easy, happy-go-lucky process, or ever will be, they are erroneously impressed. Exactness and close attention to little and big details all along the line of work are imperative. Failures are not due so much to the fault of the system employed, as the faulty manipulation or lack of care of the operator in some one or more of the steps to be followed. It is a failure when a gold inlay is not full, clean and sharp. An inlay that is not perfectly sharp and distinct in its marginal outlines should not be put in the tooth. Yet it is true that many "passable" ones are set, and sometimes by operators who really think they have done the best that could be done. The difference is as between a gold coin fresh from the mint and one that has been knocking about in circulation for some time.

If the mold for an inlay does not fill full to the sharpest outline and tracery, a *perfect* inlay is not produced. Again, an inlay may be produced that is sharp and yet will not fit the cavity. The fault in such case, more than likely, is that due care and attention was not given to making up the wax inlay or model. Let us begin at the beginning and trace out some of the things, little and big, that lead to failure or faulty fitting. If everything is done correctly the gold inlay should be a complete and exact reproduction of the wax model—barring the possibility of some little knobs due to minute air bubbles in the investment that cannot always be eliminated, but may easily be cut from the gold cast.

Tracing through the various steps we will note the things that are prone to trip even the generally careful and painstaking operator.

In the first place, the proper kind of wax must be used. It must be pure, so as to leave no sediment in the mold when burned out. It must be a wax that is quite hard in an ordinary temperature, and that will not become too soft at body temperature, and yet that may be conveniently softened for impression work and modeling. We are safer with a wax of high melting properties than one that may work easier; for although we may take pains to chill our wax it soon may become yielding in the fingers and unconsciously may be in some slight measure distorted. If it

happens to be observable we may go back to the cavity to correct or begin over. Too often it is not noticed—not until we have vainly tried, over and over, perhaps, to make it go to place. Then we may come to the conclusion that our wax in some way had gotten out of shape.

The greatest danger in handling a wax inlay is the turning of some sharp margin that has a knife or feather edge. If this is unnoticed the gold reproduction will not go to place at that point. It will *almost* go, perhaps, but in that lies the danger of setting an inlay that is very sure to bring trouble. Take a feather edge of wax, which we sometimes have along some margin, and the handling may turn it over inward into a minute scroll. If a watchful eye discovers this it may be turned out again, but if it is so invested the plaster fails to fill under it and the result is that such a defect comes out solid. If, then, it is observed it may or may not be cut or ground away satisfactorily. It depends upon circumstances. If it goes into the tooth uncorrected, it either shows plainly then, or it may be one of those near-fits that some operators might deem "passable" and proceed to cement in place. It is even possible that a thoroughly conscientious man might not discover that it was slightly a misfit.

It happens sometimes that a bit of wax in trimming becomes lodged on some portion of the cavity surface and so attaches itself as not to be noticed, and remaining there unsuspected it, of course, makes a prominence that does not permit of the inlay going snugly to place. Such a defect is hard to locate and correct in the cast. If located, of course, it may sometimes be ground off.

No doubt the best plan to pursue is to do as little handling as possible after the final removal of the wax from the tooth. To that end it is advisable to do as much finishing as can be in the mouth. One may take an impression and take it away to cut away surplus and to carve into approximate shape and then return to the cavity, slightly softened, and get the bite and trim model and smooth up as far as can be with jaws closed. Then chill the wax and hold down with the finger, or something suitable, while the lingual side is trimmed and smoothed.

Now use an instrument with a flattened blade, with which to

lift impression out, in preference to a round point, and chill again, when it is often possible to do any further trimming and carving with a *sharp, thin* blade without taking it in the fingers, thus avoiding some of the things above noted. The sprue wire may be even set in while the wax is impaled on this other instrument. One would rather do some particular trimming or dressing down of the gold than take any chance of mutilating the wax by handling too much. And yet, ordinarily, the wax can be finished in the main exactly as one wants the gold. Summing up on this wax subject, it should be kept in mind that so far as the cavity surface is concerned and the margins there should not be the slightest change from the cavity to the investment. Dropping wax even so far as the bench may destroy the fit.

Coming to the investment a suitable investing compound should be used. The ingredients cannot be too fine. A coarse investment will bring out imperfect marginal lines as well as surface.

The mix should be of a consistency to flow rather than to have to be forced into the flask with the spatula, for one reason more than another, and that is, that a thickened mass is quite likely to form caverns, and these provide an easier route for the compressed air or vapor to take than through the chamber, and, in consequence, the gold may not go down into the mold or only partially fill it.

Now, if the mix is too thin, there will be shrinking and checking in drying out, which also diverts the force and lets it pass without doing any good. There is a happy medium in mixing.

When checks of shrinking occur, they are generally circular in direction and near to the flask. My way of treating these is to just trace them with a blunt instrument, like a large ball burnisher, or the round butt end of some other instrument, using pressure enough to condense the material on either side of the check, causing it to fill into the crevice and, under the pressure, close it up. The material is never very hard and this sort of treatment seems to quite effectually close the crack.

If checks occur across the flask, or radiating from the sprue (which they rarely do), it would be of no use to proceed with such a case. Usually it means beginning over again. These checks, involving the chamber (mold), come sometimes when the invest-

ment is used too stiff, and, as stated, caverns form because it does not readily settle down on itself, but bridges over. A cavern like this near the mold will usually check through the partition and perhaps extend to the crucible, and the forced gold will follow the check as well as the sprue hole.

The first step in investing is to apply a coating to the model in a way to prevent air bubbles. The wetted wax on its sprue wire may be dipped into the investment if one chooses, and, withdrawing it, blow off with the mouth all but a thin coating. Inspection then may show that all surfaces are correctly covered and without bubbles, and that all pits or recesses have been duly filled and not bridged. These pits and recesses are the things about which the greatest care must be taken. If not filled with investment to the very depth, or if bridged entirely, the cast will have no such pit or recess, or one not deep enough to accommodate the prominence of the tooth that is to set into it. Little half-bubbles next to the wax in the investment will fill with gold and that prominence keeps the cast from fitting close. A full bubble is easily seen in the gold, but a half one or one that simply stands up like a diminutive watch crystal produces one hard to detect in the gold without the closest scrutiny, but it will hold the inlay from going snugly to place.

In drying out an investment one is apt to try to hurry matters by heating. A very moderate heat is all right; but no heat should be used that will generate steam until the moisture is all out. When steam is formed and confined in the pores of the investment explosions, more or less severe, occur that are quite likely to damage the mold and may not be apparent. The only safety is in drying out slowly. After that heat may be applied as high as required; and what is required is to burn out the wax model; and then the hotter the mold the greater the certainty of the gold not becoming cooled before it fills the minute recesses.

Some operators fail in producing sharp castings by not getting the gold hot or liquid enough, in the first place, and again in not having the mold hot enough, as above noted, and again (by some methods) in allowing the gold to begin to cool before getting the pressure on it. No appreciable time should be lost from the discontinuance of the melting flame and application of pressure. This

is a fault with the steam method. A one-fourth of a second permits the temperature of the molten gold to fall many degrees.

Faulty or imperfect blowpipes are the stumbling block of many. One that simply melts the gold will not bring sharp inlays and sometimes the mold is only partially filled up. The gold must be liquid enough to boil, and it takes an unusually good blowpipe to produce that heat. If one has compressed nitrous oxid gas and can convey this gas to the blowpipe in place of air he can have a hot enough flame for almost anything; but there are some improvements in blowpipes that give a very satisfactory flame, though not equal to oxyhydrogen.

The pressure outfits, or their equivalent on the market, are numerous. Taking everything together there is no doubt but that Dr. Taggart's apparatus is the most perfect outfit made, combining as it does provision for the hottest flame and the simultaneous application of positive pressure with cutting off the flame. No effort has been made by other inventors of outfits to improve upon Dr. Taggart's, but efforts have been mainly directed to devising other ways of getting at the results. The first thing to crop up (not by any special exploiting on the part of anyone) was the steam process. Knowledge of the steam way of making inlays became quickly and widely diffused, and, I believe, has given an impetus to the whole gold inlay proposition, because it gave every man a chance to try his hand at cast inlay making before going into expensive investment. If he was successful in turning out some good inlays, he became enthusiastic, and longed for better and more complete apparatus. If he failed with the steam and improvised outfit, he felt that that system was crude, and he wanted something more positive—more certain.

After steam came a machine for applying centrifugal force, and it seems to send the gold into the mold without any uncertainty.

Following this comes the exhaust or vacuum method, which is exactly the reverse of the pressure method, inasmuch as it sucks the gold into the mold instead of pushing it in. The thing that happens is really the same thing; a current of air or vapor is made to pass through the porous investment from top to bottom, carrying with it the liquid gold. But while the top of the flask

is sealed in one case to prevent escape of pressure, except through the investment, in the other the bottom of the flask is made to prevent the ingress of air to destroy the suction. The modus operandi is producing a vacuum in a chamber provided by the use of an exhaust pump. Above this chamber is a place to easily secure the flask after it is heated up as desired. The blowpipe is turned on to the nugget of gold and as soon as it becomes liquid enough a touch of the finger opens a cock between the flask and the vacuum, and, without discontinuing the flame, one sees the gold—or the bulk of it—disappear through the bottom of the crucible like a flash of lightning. There is no chance for the slightest cooling in a single degree, except what comes from contact with the walls of the mold. In fact, the gold is shot in so quickly that if the mold was quite cold (which, of course, it never is) the casting would probably be very sharp and perfect. It is not the particular method followed as to press work; it is the precision with which everything is done up to the application of force to overcome the spheroiding tendency of melted gold.

HYGROLOGY.

BY DR. G. ALDEN MILLS, NEW YORK CITY.

The term hygrology, so far as the knowledge of the writer goes, has not been discussed in dental literature. If it has been so discussed, then we are going to thresh only "old straw." In a religious body at which we were in attendance there was a man who always italicized his testimony of being marvelously healed of a dreadful malady by divine aid. So far, that was well and good, but he never failed to picture the disgusting features, and it became irksome to many. A very ardent, and a little erratic, member one day cried out in loud tones, "Give us some fresh bread." The man disappeared, and no one has hunted him. Not a little of the cry has gone out here and there by readers of dental literature and discussions of societies, "Yes, threshing old straw continuously." In giving this term as a subject for our article, we are reminded of an incident that occurred in connection with one of the meetings of the New York Odontological Society. A Harvard graduate was announced as essayist

for the evening, and great curiosity was evinced by the gathering ones, going from one to another, "Professor, tell us what is the meaning of the term given for the subject of the evening." This was the term: *Odontolithos.* "What does it mean, Mills? Is it anything good to eat?" We had been balked, but we had consulted one that we thought was familiar with the dead languages, and we responded: "Simple enough, when one knows." It was only this, "Stone on the Teeth, Tartar, Riggs Disease, Pyorrhea, etc."

What is Hygrology? It is the science or doctrine of the fluids of the body. Coming on this word unexpectedly, we have received a new inspiration regarding the theme. This inspiration is so emphasized in our mind to the expense of all others that have engaged so much of our thought during the last thirty-eight years, that, in passing, we congratulate any and all of those that today are emphasizing so elaborately the discovery that 150 instruments can accomplish more than the six devised by the late Dr. Riggs; yet we cannot forbear saying that a new thought has arisen and appeared in a statement made in the February journals regarding the removal of not only all the calcific deposits on the roots of the teeth, but "the dead pericemental membrane must also be removed." All right, so far as the emphasized truth is concerned, but this was the *verity* of intelligence, as taught by the late Dr. Riggs. Simply the changed phraseology, all meaning the same in principle. So long as it is recognized, more good will be the result. We have said our last word on this subject, and are only glad that we have had the intelligent inspiration to so persistently stand by the truth.

We trust that our readers will be charitable toward us for the divergence from our *new subject.* Autointoxication has been discussed for some time, and today is a live subject, worthy of all the attention it is receiving. So far it has not yet received the favorable recognition from the hands of the dentists that they appreciate the original teachings that Dr. Talbot has produced, nevertheless it is laying a foundation for a structure of real professional achievement in the near future. It is true, what we hear voiced by men of knowledge, that Dr. Talbot is our most advanced writer. Let us be proud of him and put flowers on his mantelpiece. We are prone to an oversight in this direction.

Prophylactics is another live subject. Let us do the same by this advocate. He has set going a blaze that will give a permanent trail. Our correspondence from all parts of the civilized world proves this. It is a fact that none should forget. This work is not to be delegated to women, as we have lately heard it advocated. Prophylactics, in a certain sense, does mean clean, but it does not follow that all men are clean that advocate this method. We note, in a late number of our journals, a supposed *new* idea regarding the true inwardness of the systematic monthly dealing with teeth, viz.: "It is not so much that the teeth are kept clean, but our thought is that the *change* of *structure* is the real issue of truth in the matter." This we see in the February journals. Yes, that is *our* thought as published in the *Dental Register* so far back as '67 on "Cleaning Teeth." See the article on Polishing Teeth—not then italicized—and its results. *Stimulation* is behind this, as we are aiming to show in our present article. Autointoxication contributes the toxic fluids to the already predisposed conditions of the fluids that are the primary foundations of physical organization. We find ourselves quite in a maze as this subject develops in our mind as we go on writing. We start in the fluid state, we end in ashes or dust and gaseous substance. It seems that we must give our attention more directly to the fluids of our bodies as a study. To be a profound alchemist in this study would be a contribution of value, but this has been accepted as a gigantic weakness among our fellow workers. We are called a man of theologic views regarding discord and degeneracy existing primarily. Yes, but it is a divine truth, and the man that sets his wisdom against the Creator's will yet see himself with a boomerang on his hands that will bring destruction, and there will be nothing left but dust and gas. We introduce here an illustration that is conclusive from a logic standpoint and cannot be called a theologic dogma. Our controverter contends "that man started all right physically"—admitted. Now what was the matter in the product of the first progeny? Adam had his. For what? He was disturbed. What about Eve? The subtlety of evil had beguiled her. "They feared a fear and it came upon them." What did it produce? They raised Cain, and he became a murderer. Harmony has gone, the fluids disturbed; contrast the

thought in daily life with all the changing scenes and the varied temperaments. So big a study, it launches one out into a labyrinth of mental activity. It is to the increase of harmony for which we are to educate. So we are to emphasize the need of a vast change in habit for the lessening of toxic conditions. For we little realize what havoc is being produced in the various stages of the formative tooth structure. As we write we are led to say if this article may stimulate some bright mind to make this subject a study in view of its chemical affinities, it will not be a failure, as we have before said we are not expecting the millennium, yet we are aiming at it.

HEART HAS TOO LITTLE ROOM.—What are held to be important revelations in regard to diseases of the heart were made at a meeting of the International Congress on Internal Medicine. Prof. Max Herz of the University of Vienna announced that the source of disease was not weakness of the heart itself, but was to be found in the fact that the heart could not fulfil its functions properly owing to lack of sufficient room. That this was frequently the result of holding the body in an incorrect position was shown, he declared, in the cases of writers, bookkeepers, lawyers and dentists, whoses chests become so contracted that the ribs exert an injurious pressure on the heart. In view of this fact the treatment, said the professor, must be directed to giving the heart sufficient room in which to work. Writing desks, for example, must be so arranged as to enable the patients to maintain an upright position. The patients must learn to walk erect and breathe deeply, while other gymnastics are extremely valuable. The professor asserted that treatment along such lines had proved remarkably successful in many cases.

DENTOALVEOLAR ABSCESS.—I would like to say a few words with regard to the nomenclature of this subject. It seems to me the above term ought always to be employed in referring to these abscesses. It has grown to be too much of a habit with members of the dental profession to speak of alveolar abscesses. Among ourselves it is clearly understood as to what we mean; but let this expression be employed among men who are not engaged in dentistry and they would be at a loss to know, unless they know the speaker is a dentist, as to what kind of an alveolar abscess he means. We have alveoli of the lungs, of the kidneys and liver. A physician might say, what alveoli are you talking about? But when we say dentoalveolar abscess we locate the disease, state where it is, and the expression covers the question we are considering.—TRUMAN W. BROPHY, *Dental Review.*

Digests.

SOME NEW LIGHT ON LOWER JAW DEVELOPMENT; WITH OBSERVATIONS. By Wm. Arthur Harrop, L.D.S. Glas., Glasgow, Scotland. The manner of development of the lower jaw has hitherto been the subject of much diversity of teaching. Various types of ossification have been noted by histologists—intramembranous, endochondral and the so-called metaplastic type of Strelzoff. Most anatomists have regarded the mammalian lower jaw as a compound bone, and have attempted to find homologies for its component parts in the jaws of lower vertebrates. It was my privilege to study a paper by Dr. Alexander Low, senior assistant to the Professor of Anatomy in Aberdeen University, on his research in the direction of the elucidation of this much discussed problem. I was so impressed with the magnitude and completeness of his most arduous undertaking, that I venture to place before you, in as concise a way as possible, the conclusions at which he arrived. And I may here say, from the histologist's point of view, that in my opinion these results approximate more nearly to the truth than any others with which I have been acquainted, and I think I have studied most of the accounts of lower jaw development of any note on record.

Before I briefly review the most widely accepted theories, let me first relate the manner in which Dr. Low carried out his research.

He felt that in order thoroughly to understand lower jaw ossification it was necessary to obtain a complete series of embryos of any one mammal and to make and mount complete serial sections of the head or lower jaw of these embryos. Further, it was necessary, especially in the earlier stages when the changes are very rapid, to make sections in different planes, i. e., coronal, sagittal and horizontal. It was after this laborious manner that he examined the developing jaw of man and various mammals. He has a very complete series of human embryos and fetuses ranging from 10 mm. in length (crown-rump measurement). Through his kindness I am able to illustrate this paper with lantern-slides of photomicrographs of his own preparations of the human jaw. With these I shall show a few of my own sections.

He also reconstructed by Born's wax-plate method three models of developing lower jaw, which confirm the conclusions at which he arrived from a study of the sections. I am able to show you a stereoscopic view of one of these. You will, therefore, appreciate more fully the value of this exhaustive research.

Most of you will, by this time, no doubt, have forgotten all the details of lower jaw development with which you were once acquainted. So I will briefly review one or two of the most outstanding theories relating thereto. In Quain's Anatomy (15) Schafer says that "the process of ossification commences very early, being preceded only by the clavicle, and proceeds rapidly; it takes place from several centers, which are united by the fourth month. The largest part of each half is formed from a deposit (dentary) in the membrane on the outer side of Meckel's cartilage, and to this there is added a second smaller plate (splenial) which forms the inner wall of the tooth-sockets, terminating behind the lingula. A small part of the body by the side of the symphysis results from the direct ossification of the anterior end of Meckel's cartilage and posteriorly, the condyle and a portion of the ramus, including the angle, are developed from another ossification in cartilage."

If I remember rightly, Bland-Sutton was the victim chosen to be the bane of the dental student aspiring to the glories of the diploma. He describes six centers of ossification and says, "The order of events may be arranged in stages for the sake of clearness thus:—

1. Meckel's cartilage appears.
2. Dentary appears below.
3. Centers for condyle, coronoid, angle and mentomeckelian.
4. Network of osseous tissue connects them together.
5. Splenial appears as a ledge of bone supporting the teeth.
6. Disappearance of Meckel's cartilage from jaw, and fusion of splenial."

All that part of the lower jaw in front of the mental foramen is an ossification of Meckel's cartilage. He describes the inferior dental nerve and splenial as lying below Meckel's cartilage, and says that after the fourth month Meckel's cartilage atrophies, and the splenial passes down to inclose the nerve.

For the rest of the literature on the subject it may merely be

said that some hold that Meckel's cartilage takes no part in lower jaw formation; others describe four and five centers of ossification; while there are still others who suggest that there is only one center for the whole membranous jaw.

Dr. Low tells me that Professor Bardeleben still contends that

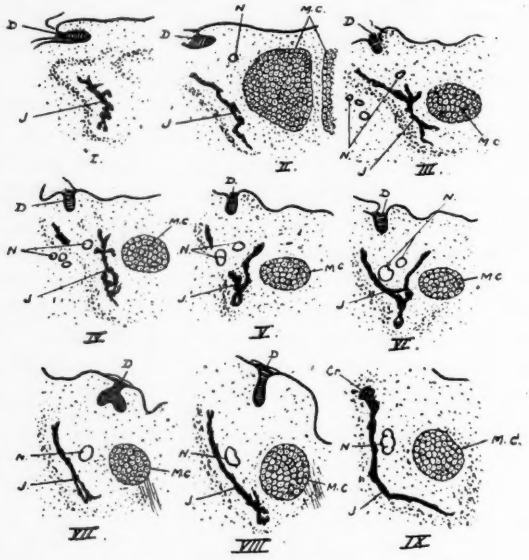

FIG. 2.

CORONAL SECTIONS OF THE RIGHT HALF OF THE LOWER JAW OF A HUMAN FŒTUS, 28 mm. in length.

I. shows the membrane bone in front of Meckel's cartilage;
II. is through the enlarged anterior extremity of Meckel's cartilage;
III. is a section in front of the mental foramen;
IV. is near the anterior margin of the mental foramen;
V. near the posterior margin of the mental foramen;
VI. through middle of body of jaw;
VII.-VIII. through posterior part of body;
IX. through the coronoid process;
J., lower jaw, a continuous sheet of membrane bone; D., dental lamina; N., inferior dental nerve; M.C., Meckel's cartilage; Cr., coronoid process (showing no sign of cartilage at this stage).

there are present six separate elements in the developing lower jaw. He says he can trace out the lines of junction of the different pieces in the lower jaw of the full-time human fetus. Dr. Low has seen drawings of his preparations and some of the preparations themselves, but does not think them convincing.

But let that suffice to show the diversity of views on this sub-

ject, and we will now consider the conclusions drawn from this research by Dr. Low. This I shall do in a very general way without going into details.

In an embryo of 10 mm. there is no indication of Meckel's cartilage at all, but it is already well formed in one of 15 mm. In an embryo of 18 mm. ossification is present as a very delicate lamella of bone developed in the mesoderm of the outer aspect of Meckel's cartilage. This lamella extends forward almost to the

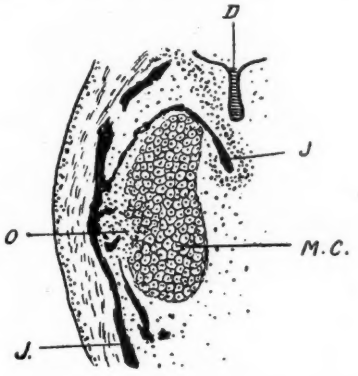

FIG. 3.

Vertical Section, between central and lateral incisor tooth-germs, of lower jaw of human fœtus, 43mm. in length. Showing the portion of Meckel's Cartilage (M.C.) which becomes incorporated in the lower jaw (J.), and ossification extending into it at O. The membrane bone is seen overarching it so as eventually to enclose it.

middle line; and in an embryo of 28 mm. ossification has extended so that each half of the lower jaw is mapped out as one complete membrane bone and from its mesial aspect a dental shelf has commenced to grow inward so as to overhang Meckel's cartilage from the outer side. The latter (Meckel's cartilage) is enlarged and club-shaped at its anterior end, but becomes rapidly less when traced back toward the mental foramen, while behind this point its diameter increases somewhat.

Tracing the membrane bone from behind forward, it first of all forms a simple lamella in which the coronoid process and angle are already distinctly outlined. Still more forward in the region of the last temporary molar tooth-germ, a distinct tooth gutter

begins to be formed, a coronal section of the jaw a little in front of this having a Y-shaped appearance with lateral and mesial walls. These can be traced forward as far as the cuspid tooth, where

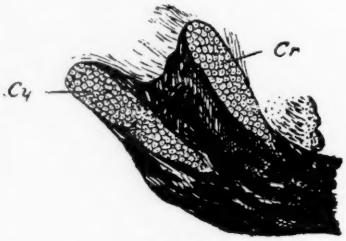

FIG. 4.

Sagittal Section of the posterior part of the lower jaw of a human fœtus, 95 mm. in length. Showing the relation of the coronoid (Cr.) and Condylar (Cy.) cartilages to the membrane bone.

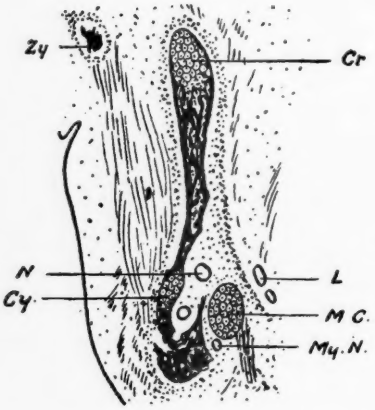

FIG. 5.

Coronal Section through coronoid process of the right half of the lower jaw of a human fœtus, 103 mm. in length. Cr., coronoid cartilage; Cy., condylar cartilage; Zy., Zygoma; M.C., Meckel's Cartilage; N., inferior dental nerve; L., lingual nerve; My. N., mylo-hyoid nerve.

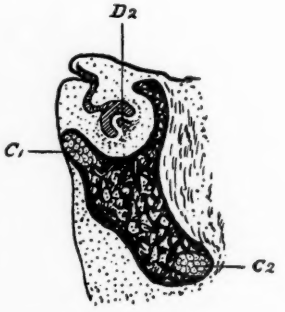

FIG. 6.

Vertical Section of the lower jaw of a human fœtus, 230 mm. in length, through the left lateral incisor tooth germ (D_2), showing the cartilage in the inner alveolar margin (C_1), and in the lower border of the jaw (C_2).

the mesial wall disappears, the lateral only being continued forward.

We thus see that each half of the lower jaw is developed in membrane as a simple skeletal element—the dentary—and the

so-called splenial element is simply an extension of this, helping to form the inner alveolar wall, and does not exist as a separate element.

The successive stages in development we must rapidly review; and those connected with the "scaffolding," or Meckel's cartilage, we will now consider. This cartilage becomes somewhat flattened from before back at its anterior end where it touches the membrane bone just opposite the interval between the lateral and cuspid germs. It gradually becomes ossified and incorporated with that part of the lower jaw in this region, i. e., below and inside the central and lateral incisor teeth. Posterior to this point Meckel's cartilage does not enter into the formation of the lower jaw, nor does the actual anterior extremity enter into its formation, but usually persists throughout fetal life as a cartilaginous nodule behind the symphysis.

Ossification in membrane extends, producing a lattice-like structure in place of the simple lamella. At a comparatively late stage in development certain accessory cartilaginous nuclei appear in connection with the primary membrane bone. Thus, there is a well-defined, wedge-shaped, condylar cartilage and a smaller coronoid cartilage. In addition to these there are smaller cartilaginous nuclei, in the form of strips, along the margins of both alveolar walls in front, and one along the front of the lower border of the jaw. It is quite possible that the existence of these cartilaginous nuclei have been taken to represent centers of ossification by some observers. But Dr. Low gave me as his reasons for holding that these various "accessory" cartilages do not mean separate centers, but are only an adaptation to the growth of the jaw, that:

1. They are late in appearing.

2. They have no separate centers of ossification, but become resorbed and ossification extends into them.

3. They have no relation to the primitive cartilaginous skeleton of the head.

4. Quite similar pieces of cartilage are found in connection with other membrane bones of the skull; e. g., proc. palatinum of superior maxilla, Zygomatic, Vomer, etc.

Some have described a cartilaginous nucleus in the angle of the

jaw, but in the human lower jaw Low has not observed a definite angular cartilaginous nucleus, although he has observed it quite distinctly in many other mammals.

After six months Meckel's cartilage rapidly atrophies, so that at birth there is hardly any trace of it in connection with the

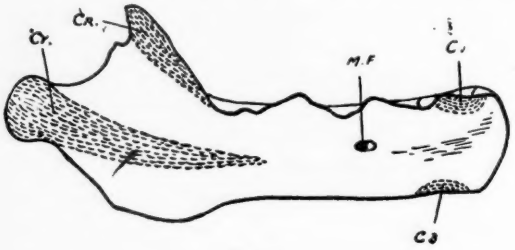

FIG. 7.

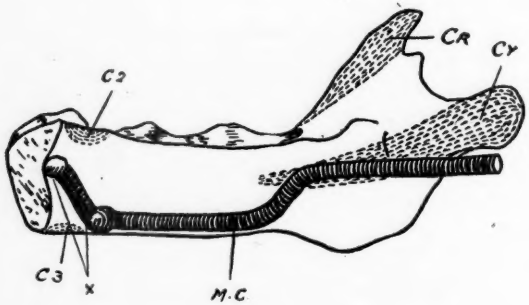

FIG. 8.

SCHEME OF THE DEVELOPING HUMAN LOWER JAW (right half).
Fig. 7 viewed from the outer and Fig. 8 from the inner aspect. The figures show the single membrane bone (*the dentary*) with its accessory cartilaginous nuclei. CT., Condyloid Cartilage; CR., Coronoid cartilage; C_1, cartilaginous nucleus at outer alveolar margin; C_2, Cartilaginous nucleus at inner alveolar margin; C_3, Cartilaginous nucleus at lower border; M.C., Meckel's Cartilage, with X indicating the part which becomes incorporated with the lower jaw. (*After Dr. Low.*)

lower jaw. At birth the condylar and coronoid cartilages have practically disappeared.

I should very much like to have discussed the bearing of these early changes on the ultimate development of the jaw. This, however, must be left till a future occasion. But in regard to post-natal growth, I might just remind you that the increase in the size of the jaw is due, not to interstitial growth, but to additions

at the back in the situation of the permanent molars, and to the surface and lower border of the bone. Reference to the diagram on p. 228 of Tomes' Dental Anatomy (1904) will make this quite clear. That writer compares the growth to a "modeling process in which thick, comparatively shapeless masses are dabbed on to be trimmed and pared down into form."

Apart from the interest which attaches to the important research, of which I have given you a resumé, most of you will doubtless think there is little of practical value in bringing it forward. I wish to dissent from that view. Most of us will have to do with regulation of the teeth and some of us attempt to make a special study of orthodontia. In order to do this thoroughly, we must take into consideration what I believe a matter of some importance —the influence of the growth of the bone on the ultimate arrangement of the teeth. We may be inclined to set down all pathologic conditions as due to local conditions in and about the mouth itself without any reference to prenatal conditions. In regard to irregularities of the teeth, the method which commends itself to me in commencing their special study, is to get an intelligent grasp of the development, not only of the teeth, but their associated parts. It is necessary to have a knowledge of the influence of the constitution, of embryology and of evolution.

Is the growth of the jaw dependent on the presence of teeth? Or is the presence and comparative regularity of the teeth dependent on the growth of the jaw? Tomes evidently holds the former view, and cites, as an example, the case of the hairy Russian who was almost toothless and who had no true molars; and no backward elongation of the jaw had ever taken place, his jaw being no larger than a child's. On the other hand, Mr. J. G. Turner, in a paper read at the Fouth International Dental Congress, reprinted in the Cosmos (January, 1905), suggests that "the normal orderly arrangement of the teeth in the jaws is the result of normal growth of the bone, and, as a corollary, that most deformities of the dental arch are in consequence of disordered growth of bone."

He instances this dependence of the teeth on bone in the manner of eruption of the three permanent molars, being rotated and carried into proper place from the positions occupied by the germs,

by the growth of bone. He also refers to the spacing of the front temporary teeth "before they are shed and carried forward by the normal growth of bone." But I think the spacing is due to, and does not take place before, their being carried forward by the growth of bone; for, except in the case of some slight symphysial addition of bone increasing the space between the central teeth, no interstitial growth takes place.

Mr. Turner showed models in which early extraction of the first permanent molar resulted in the bicuspids, capsule and all, being carried bodily back, till coming into contact with the second molar. And I must confess that the models do not seem to indicate that a movement due to the attempt of the teeth to find a resting place had occured. He, moreover, cities cases of persistent naso-pharyngeal obstruction, in which, as you know, there is want of growth of all the bone forming the upper air passages, including the maxillæ. The teeth seem to occupy relative positions very much like those held before eruption. Whilst not minimizing other causes of irregularity, he believes that "the disengagement of the teeth from their 'fetal' positions and their translation to their positions in the normal arch is the work of growing bone; and whatever interferes with growth interferes with the perfection of the dental arch, and when the growing period has passed any deformity that is left is permanent."

As an introduction to the study of these questions of practical importance it is necessary to understand the development of the associated parts of the teeth from the earliest stages.

That is my whole apology for bringing this subject forward. And I trust that, viewing it in this light, even those of you who are not interested in embryology, will not consider our time wasted.—*Dental Record.*

DENTAL PROPHYLAXIS AS APPLIED IN THE DAILY ROUTINE OF PATIENTS, WITH SPECIAL REFERENCE TO THE PRESERVATION OF THE THIRD MOLARS. By Joseph Head, M.D., D.D.S., Philadelphia, Pa. It has been found that saliva has a profound inhibitory action on the acid decalcification of the teeth, and especially so in the case of lactic acid. For instance, a one to five hundred lactic acid watery solution will de-

calcify tooth-enamel badly in thirty minutes, but a one to five hundred lactic acid saliva solution has protected tooth-enamel for fifteen days without the slightest sign of decalcification being apparent. According to some tests made by me, the ordinary mouth-washes were not able to more than penetrate the outer layer of such a bacterial mass as can collect between the teeth in from twenty-four to forty-eight hours. If such a mass as collects between the teeth or under the edge of the gum is lactic acid-forming, the thick mucous coating may effectually keep the saliva or mouth-wash entirely out of the lower portions of the colony, which thus is at liberty to set free its lactic acid in a condition most favorable for tooth-decalcification. A 1:20,000 lactic acid watery solution will decalcify enamel in from eight to ten days so that cheesy looking shavings can be pared with a lancet from the slightly whitened, shiny decalcified surface. Thus it seems clear that any such acid, guarded from the neutralizing action of alkaline disinfectant mouth-washes or normal saliva, will speedily attack the enamel and dentin substance.

The question of prophylaxis is primarily, How are we to neutralize the effect of these bacterial masses, which not only let loose acid, free to cause decalcification of tooth-structure, but also allow infection both of the tooth-structure and of the gums? The philosophy of the procedure is simplicity itself. These masses of bacteria must be mechanically removed with sufficient frequency to prevent them from growing large enough to form decalcifying acid or to infect the soft tissues. After these masses are removed, alkaline disinfectants on the one hand will inhibit the growth of the thin bacterial film that may be left, while on the other hand the normal saliva will readily hold in control any stray acid that may develop within the next six or twelve hours. For a mass of bacteria such as would be dangerous as infection or as an acid-developer can hardly grow from a bacterial spread film in less than twenty-four hours. Thus if these colonies are removed, say every twelve hours and their locations treated with alkaline antiseptics, it follows as a matter of course that the teeth and gums will be kept free from harmful decay or decalcification. Dangerous pits or spots of decalcification will have to be made smooth and capable of being easily cleansed by operative procedure, and therefore do not come under the present discussion. Neither do I speak of the

methods and instruments used for removing tartar masses, as that most difficult of operations must be accomplished at judicious intervals by office treatment at the hands of the dentist.

The question under discussion is, Given a patient with a set of teeth free from imperfections and infection and superficial discoloration, how shall we so instruct and train the patient that the teeth will remain practically free from infection between his prescribed office visits?

Recent tests prove conclusively that tooth-powders cut the teeth; they also prove that wet toothbrushes without such powders do not cut the teeth. Therefore, the toothbrush wet with water or an antiseptic should be skilfully used so that every surface of the teeth and gums capable of being so reached shall be brushed free from bacterial plaques at least every morning and evening. Tooth powder should be used guardedly. Merely rinsing, it has been demonstrated, will not remove these plaques, but the toothbrush will, and so the patient should be instructed how to thoroughly brush the gums and teeth. Healthy gums, in my opinion, can withstand brushing quite as readily as the tissue about the finger nails. Infected gums will bleed and be lacerated by vigorous brushing, and in getting well will also contract and recede to the size of healthy tissue. Nevertheless, the best way to cure bleeding infected gums is to keep them free from infectious masses, and the toothbrush vigorously and skilfully used is ordinarily the best instrument for removing and excluding such infection colonies. And yet it is an incontrovertible fact that the toothbrush will not cleanse the interproximal spaces of the teeth, where acid infection masses most readily accomplish their work of destruction. These masses must be removed, and to tell patients to rely for their removal either upon the toothbrush or rinsing with mouth-washes is to lull both them and ourselves with a sense of false security. The only way in which bacterial masses between the teeth can be rendered harmless or be destroyed is to remove them mechanically.

One dentist told me that he instructed his patients to brush the teeth for fifteen minutes morning and evening, using plenty of tooth powder. Were the patients to brush the teeth for ten hours a day until all the enamel was worn away they would not be able by this procedure to cleanse the interproximal spaces; while a two-minute brushing ought to be able to cleanse the exposed surfaces

perfectly. We can only cleanse the interproximal spaces with something that will readily get into the spaces, and that something is floss silk. If, for instance, morning and evening both surfaces of each approximal space are swept with floss silk, and if the exterior surfaces of the teeth and gums are cleansed thoroughly with brush and water, and finally the mouth is bathed for two minutes with a copious quantity of some alkaline antiseptic mouth-wash, new decay and infection ought to cease entirely. A loop of floss silk passed entirely around the neck of each tooth and slipped from the gum margin over the cutting edge will cleanse the tooth of soft deposits better than the old-fashioned way of merely slipping the silk in and out of each interproximal space. The mouth washes I have found most valuable are Glyco-thymoline and Listerine; there are many good ones. Merely to sprinkle a little antiseptic material on the toothbrush is to fail. After the colonies are removed mechanically the remaining films must be bathed with a considerable volume of the antiseptic agent for a considerable time, if the remaining bacteria are to be destroyed or their growth appreciably inhibited. One part of Listerine or Glyco-thymoline to three parts of water, held in the mouth for two minutes, is a reasonable procedure, but if the patient while dressing can hold the solution in the mouth for five minutes the extra time will be well spent.

But now let us speak of cleansing the third molars, for these teeth owe their proneness to decay simply to the fact that they are seldom if ever brushed. This arises from their peculiar anatomic position, which renders them difficult of access. The ramus of the mandible closes completely past the upper third molar, while the lower third molar is so buried in bone and gum beside the ramus where it joins the body of the mandible that only special training can enable our patients to brush these teeth and their gum attachments really clean. The spring of the bristles of a toothbrush when in use is about half an inch. When, therefore, in the ordinary procedure the brush is thrust backward in the effort to cleanse the upper third molars the back of the brush strikes the ramus of the jaw so that the bristles reach only to the middle of the buccal surface of the second molar. In pulling it forward the bristles pivot on the tooth substance without practical friction until the back of the brush has well passed the bristle ends, which

means that the second molar is only half brushed and the third not at all. The same difficulty occurs with the lower second and third molars to almost the same extent. Since teeth, then, can only be brushed clean by bristle friction, unless some means be found to get greater scope for the brush so that the back of the brush can reach at least half an inch beyond the third molars, the brushing of the latter teeth with a toothbrush is out of the question. While the jaws are closed, or nearly so, as the ordinary daily brushing shows, this greater scope is impracticable, but if the patient will open the mouth wide the ramus of the lower jaw will swing back so that there will be a space of three-quarters of an inch, into which the toothbrush can be inserted so that the middle of the brush can be placed squarely back of the third molar. Then by drawing the brush vigorously backward and forward the third and second molars can be readily cleansed. The same procedure applies to the lower third molars. The middle of the brush should be placed back of the third molars, when with a dragging motion along the necks of the teeth, perfect removal of the bacterial masses will be readily accomplished. Sometimes the posterior surface of the third molars is buried in gum up to the grinding surface. Sometimes the gum has so receded that the surface just back of the tooth is most difficult to reach with a brush. When either of these conditions arises the patient should be taught to sweep the posterior wall of the third molar with narrow tape or floss silk, which will readily accomplish what the brush could not.

I have not gone into the various methods of using a toothbrush; the up-and-down motion, the backward and forward motion, or the small rotary. What we wish in brushing the gums and teeth is bristle friction, and any method that will accomplish this is effective, and any that will not accomplish it is ineffective. The great and final proof of the efficiency of any method of prophylaxis lies in the one great question, does it keep the teeth clean? The great proof that the patient has properly brushed the teeth is clean teeth, and when the teeth are found either generally or locally covered with bacterial colonies it is absolute evidence that the patient is either ignorant or careless. Sometimes it also means that the dentist is careless. I have not discussed the general systemic conditions when acid phosphate salts may be poured into the mouth through the salivary glands, but where this

is suspected, in addition to the treatment just given, the mouth should be rinsed with milk of magnesia every evening just before retiring.—*Dental Cosmos.*

CARIES AS A SOURCE OF INFECTION. By Geo. W. Cook, D.D.S., Chicago. About a decade ago I presented some investigations on the bacteriology of decayed human teeth. From that time up to the present I have studied and observed with interest a number of phenomena that are striking, in that they furnish an extensive field for further investigation. I had devoted about three years prior to the time above referred to to investigating the possibilities of tissue beyond the apical ends of the roots of teeth becoming infected by some of the more pathogenic forms of bacteria, especially those of tuberculosis and actinomycosis. On following up these distinctive pathologic conditions I have isolated, and studied with some care, a large number of bacteria found in and around the tissues of tooth substance. I have also followed up my observations on the possibilities of the cervical lymphatic glands becoming infected from badly broken-down tooth substance.

These observations have been verified, both from a clinical and experimental standpoint, by others. I have also added to the list of cases. At that time I reported a number of well-defined cases of infection. I am better prepared at this time to state that the observations then made were founded on correct bases.

That infection of a tubercular nature can pass through the pulp canals of teeth into the surrounding tissues, far beyond the seat of entrance, is a fact beyond any question. When I say pass through the pulp canals of teeth, I do not wish to be understood as saying that these microorganisms will pass through the healthy pulp tissue, but that they will pass through after the pulp has been completely disintegrated. This has been demonstrated.

The morphologic changes that must of necessity take place in certain forms of bacteria in the mouth make it extremely difficult to determine always by microscopic slide examination the true bacterial forms there exhibited. Therefore, in most cases we injected or inoculated animals with the products from these root canals and tissues around the teeth. There is one thing that was

striking in the cases where a microscopic finding revealed a tubercular bacilli in which there had been a considerable mass of putrefying pulp tissue, that the bacilli of tuberculosis seldom gave a positive pathogenic effect. This fact seemed to reveal a question of considerable interest, and that is, will the tubercular bacilli remain constantly virulent in the presence of putrefactive processes of animal tissue? This question might also be applied to many other bacteria. However, the presence of a putrefying mass could have but little influence upon the strictly pus-producing microorganisms of the human mouth. Their environments in such a condition seem to have but little effect upon their virulent properties, for it has been found that the staphylococcus in putrefactive processes would produce an acute inflammation and pus formation in animals without any reference to where they had previously been located.

In this connection I might say that the pus-producing organisms found in carious teeth, or in the putrefactive processes of the pulp tissue, under strictly aerobic conditions, maintain their virulent properties with almost constant regularity. In the decomposition of the pulp, under anaerobic conditions, they, to an extent, are changed morphologically and sometimes pathologically. However, if they have a living tissue from which to draw their oxygen they are much more liable to maintain their virulency, almost to a constant degree.

One of the peculiarities that seems to exist, with reference to the bacteria of the human mouth, is that they are peculiarly symbiotic; in other words, they can live in constant relation with each other, producing various processes of fermentation and decomposition of tissue, apparently producing these various processes as if there was but one microorganism present. There is one peculiar process that is hard to harmonize with the facts in certain processes, and that is, oftentimes we will find a tooth broken down and caries reaching the pulp and the pulp has decomposed. We often speak of this as a putrescent pulp, when, as a matter of fact, putrefaction does not take place to but a slight degree in the presence of the free oxygen of the air. In such cases I have found the pulp to contain a number of bacteria, some which might cause putrefaction, some fermentation, and some capable

of producing pathologic changes in living tissue. In such cases the bacteria present will cause tissue changes, to the extent that we may have but slight degeneration of the tissues, as, for instance, in abscesses without a sinus around the apical ends of the roots of teeth, until there has been considerable loss of tissue. A large pocket may be the result without there being any very active inflammatory process. On the other hand, such processes may not terminate into pus formation at all. But in the formation of cystic sacs around the roots of the teeth, the serous product may be of such a nature as to act on the bacterial cell and cause its complete destruction without there having been any particular disease process, other than that of a cystic or a degenerative change that goes on from the changed functional activity of the tissue cells, as they appear in such pathologic processes.

We find constant only a few distinctive forms of bacteria of the teeth in badly carious conditions and in the destruction of the pulp tissue, while investigations show the presence of many others that may be intruders in these territories, any one of which may be capable of producing pathologic conditions if permitted to enter the living tissue. The tubercular bacilli and the ray-fungus are apparently capable of passing through the decomposing masses of the pulp tissue and successfully reaching a place where they either will be taken up by the lymphatic system or reaching the tissue surrounding and producing their peculiar pathologic processes.

In a previous paper on actinomycosis, I showed that some of these ray-fungi were capable of living a non-pathogenic parasitic life for an almost indefinite period; in other words, I found in a badly decayed and broken-down tooth a ray-fungus which had all the characteristics in morphologic appearance of the typical forms. I kept this case under observation for more than a year, to find the ray-fungi down in the pulp canals, and never, so far as my observation went, did they produce any of the characteristic pathologic lesions. Berestneff classified the ray-fungus into a saprophyte or non-pathogenic and parasite or pathogenic ray-fungus. At the time my former observations were made I was of the opinion that this was rather uncertain, inasmuch as the ray-fungus, as I have studied its peculiarities, seldom, if ever, really established a saprophytic process. While to an extent it can

live in dead tissue, it will seldom, if at all, produce what we at the present time understand as putrefactive processes. But this question interests us but little in this connection.

In a case of actinomycosis that came under my observation in 1903-1904, I determined the fact that the ray-fungus has many peculiarities when it is subjected to the oral secretions and permitted to remain there for a considerable time. It will very seldom grow in the saliva of the human mouth as the branching thread form, as it does on the ordinary artificial culture media, but it will, in the majority of cases, grow in long thread forms and break up into comparatively short rods. In a culture media made by taking the salivary glands of the bovine and chopping the gland tissue up and expressing out all the fluid, after adding distilled water to the mass and making agar-agar from the solution, this organism grows only in the branching threads without producing the characteristic club ends. When it is grown in this media for some time and transferred back to the human saliva it grows only as short threads and rod-form.

This observation is sufficient to justify our statement formerly made—that the ray-fungus' natural habitat is not that of the human oral cavity. Of course, from the cases reported in the previous paper, infection from the ray-fungus is usually brought to the oral cavity from the hay or grass fields, barley, or wheat straw; for it has been shown that the transferring of this organism from diseased cattle to other animals of the same species is not attended with any great success.

In the discussion of the tubercular bacilli in connection with such processes we are not able to obtain such accurate data as in the case of the ray-fungus, for the simple reason that the ray-fungus can be cultivated artificially more easily than tubercular bacilli.

My object in presenting this paper at this time is to state that after ten years of study upon these problems I am more than ever convinced that my early observations were correct. I have, since reporting the former cases, added three more cases of tubercular gland infection with surrounding tissue, that are directly traceable to badly broken-down decayed teeth, with two cases of actinomycosis. One of these tubercular infections was such a marked and interesting case that I should like to speak

of some of the peculiarities that I there found: A woman, 37 years of age, had been operated upon by the general surgeon for the removal of the cervical glands on the right side of the neck. Several operations had been performed before she came under my observation. She had two badly broken-down molar teeth on the right side, with the pulp canals open to the apex, and with a sinus discharging on the buccal surface near the roots of one of the teeth. These roots were removed, and scrapings taken from the pocket were inoculated into guinea pigs and rabbits. These animals showed signs of tuberculosis in a comparatively short period; the nodulated tissue at the point of inoculation was removed and the examination showed the presence of the tubercular bacilli. The roots of the other tooth were removed and a thorough curetting of the pockets and tissues was performed. She then returned to the surgeon, who removed more cervical glands along the border and angle of the jaw, and the case made a very successful recovery.

Since we recognize that bacteria are the principal exciting causes of disease and produce many of the pathologic lesions that are manifested in the morbid changes of the tissues, we cannot fail to see the importance of a closer and more minute study of special bacteria that are intruders in the oral cavity. But it also leads us to the importance of more minutely studying the bacteria that are habitual inhabitants of the mouth, and especially those that are so intimately connected with the diseases of the teeth and surrounding tissue. Since we are forced by the strong circumstantial evidence to believe that bacteria play an important role in decay of teeth, and are always present in a carious and broken-down tooth, it indicates at once that we have closely allied with the mouth and the digestive tract a great source of infection. From the history of individual cases we are able to follow closely the artificial cultivation of bacteria and by inoculating animals with these various forms removed from carious dentin and pulp canals we may demonstrate many bacteria that are extreme exciters of diseased tissue.

The presence of the staphylococcus and streptococcus are frequently met with in such localities as we have mentioned. And since we look upon these microorganic unicellular organisms as

taking an active part in inflammation and suppuration, it is important that these organisms should be studied with a great deal of care. Since my early bacteriologic study of the organisms of the human mouth, and the diseased tissues that are so frequently present in the oral cavity, I have on a number of occasions found these organisms almost incapable of exciting inflammatory processes after their removal from decayed teeth. After inoculating them into animals with varying results for pathogenic properties, it leads one into the realms of the comparatively unknowable. It is difficult to determine the kind and class of culture media that are required to render these organisms non-virulent, or by growing them slowly that they are capable of maintaining their virulent properties.

It has been shown by a number of investigators that the streptococcus brevis is quite commonly observed in the oral cavity. This particular form is supposed, under ordinary circumstances, to be quite free from pathogenic properties when inserted in the tissue, although it has, under some circumstances, produced marked inflammatory processes. It can also take part in the formation of acids. There have been isolated from carious teeth about nine different forms of bacteria, any one of which is capable of breaking up carbohydrate compounds and forming acids.

A very interesting fact I have observed in studying the inoculation of animals from carious teeth is, that only in a few instances did we fail to have response from the animals, showing direct effects of the virulency of the organisms introduced into them. It has not always been an easy matter to recover these organisms from the animal bodies after inoculation and incubation. There seems to be formed many times in the animal, after inoculation, an antitoxin or some substance that destroys the bacterial cell. But if these bacteria are introduced directly from the teeth into the animal body the animal invariably responds to the inoculation, and sometimes with such severity that it causes acute septicemia that terminates fatally. This brings to our notice an important point, and that is, an instrument used in the excavation of carious cavities should never be allowed to enter the tissues around the patient's teeth or wound the hands of the operator. If such a condition should occur the operator should at once take the neces-

sary precaution to disinfect the part. This also illustrates another important point, and that is, that artificial cultivation of bacteria from carious teeth invariably means the lessening of the virulency of these bacteria. Of course, it would be quite impossible for me, with the limited observations of cultivating the tubercular bacilli in and around carious teeth, to say whether or not this organism would have a more pathogenic property than it would under ordinary circumstances.

The observations that I have made lead me to believe that the bacteria that are constantly present in badly decayed teeth are of an extremely virulent nature; especially is this true of the bacillus dentalis, the streptococcus and staphylococcus. When I have cultivated these organisms in a bouillon media, made from the salivary glands of animals, they invariably show a greater virulency than they do when cultivated in ordinary culture media. In a number of instances animals, in which inoculations were made directly from decayed teeth, would develop more acute forms of inflammation and would run a more fatal course in the animals than they did in either the common ordinary culture media or the specially prepared culture media, as above mentioned. As I have just said, we should be aware of the infectious nature of bacteria in carious dentin.

In carrying on some of the experimental work above referred to, I have, on a great number of occasions, attempted to determine, as far as possible, what agent could be introduced as a disinfectant in the cases in which the infection had been introduced. Among a large number of agents that are classed as antiseptics and disinfectants I have come to look upon chinosol as first in the list to be introduced into the tissues, if accidental inoculation should occur. Tricresol is the next agent in efficiency. But it is important that these agents should be introduced immediately or as soon as possible after the accidental inoculation.

It should be the practice of every dentist when excavating or working around a carious tooth to apply a disinfectant to the cavity during the operation, repeating a number of times. I might say that the most efficient remedies for application in the cavities of teeth are iodin and chloroform, because they are splendid agents for disinfecting and they will penetrate carious dentin fur-

ther than any other agent. In the use of iodin in carious cavities a 10 or 15 per cent solution of potassium hydrate should be applied, and then, with a solution of ammonia water, the cavity can be thoroughly sterilized and the discoloration removed. Then should the operator's instrument accidentally injure the soft tissues there will be no possible harm follow of an infectious nature. If these general rules are followed, it will save the possible acute or inflammatory conditions being established that would result in a permanently infected condition of the gum tissue.—*Dental Review.*

THE TONGUE. By J. S. Cassidy, M.D., D.D.S., Covington, Ky. Although the subject of our sketch, especially when attached to our patients, gives us as much physical trouble and vexation as any other one thing with which we have to contend, and although, also, it involuntarily acts as our friend in many ways, we have been indifferent to, and, indeed, almost unconscious of, the fact of its existence.

Time was, not so long ago, when the family doctor, after getting a whiff of the odor peculiar to the given disease, thereby arriving immediately at a true decision in regard to the case in hand, confirmed beyond question his instinctive diagnosis by feeling the pulse and looking at the tongue; but nowadays, as a rule, he ignores these diagnostic aids, except the smell and, instead, he employs a self-recording thermometer, the stethophone, the sphygmograph and other instruments of precision. Time was, also, when we, too, were more in touch with the tongue and its surroundings than we have been since the inevitably universal use of the rubber dam. The mouth in its entirety was as an open book to us, throughout the time of every operation. As things are now lacking certain interests which formerly obtained, there may be novelty at least, if not much information, in the following description taken from an old work on anatomy:

"The mouth is separated from the nose by the hard and soft palate and communicates behind with the fauces. It is bounded in the front by the lips, while its floor is formed by the mylohyoid muscles, and its sides by the cheeks. The space between the lips and the teeth is called the vestibule. The mouth is lined by a mucous membrane which has a variable degree of thickness

and is thrown into folds which are called frena. There is one beneath the tongue, one in front of the epiglottis cartilage at the roof of the tongue, and one at the middle of the inner surface of each of the lips. This membrane is covered with numerous glands, some of which are mucous and some salivary.

"Internally the lips are composed of muscular fibers which extend from the middle of the internal surface of each lip to the gum, of fat, and externally of skin. The upper lip is thicker and longer than the lower and has a vertical depression on the middle of its front surface, the philtrum.

"The gums are formed of the lining membrane of the mouth, much thickened. They have great hardness and vascularity, and but little sensibility in health. They include the neck of the tooth and adhere firmly to the periosteum. The gums and lips are covered by numerous papillæ, which consist of capillaries and nerves. The cheeks are composed of muscle, fat, cellular tissues, glands and blood vessels, included between skin and mucous membrane. The tongue is an oblong, flattened muscular body, which varies in size and shape. It is the organ of the taste and also of importance in speech and mastication. Its posterior extremity, or root, is attached to the hyoid bone by yellow fibrous tissue. Its anterior extremity is called its point or tip; the intervening portion, its body.

"The mucous covering of the tongue is very thick upon its upper surface and very thin upon its under surface. Sometimes the term periglottis is applied to the epithelium of the upper surface. Upon its upper surface are a number of projections or papillæ of various sizes and shapes. The largest are eight or nine in number, called papillæ maximæ, and are situated at the posterior portion of the tongue, in two convergent lines. They are surrounded by fossæ, the largest of which is in the middle and called the foramen cæcum. The larger papillæ will be found to be covered by smaller ones, which are called secondary papillæ. The smallest papillæ are fine and pointed and are found near the middle of the tongue and are termed filiform. The intermediate papillæ are most abundant; some of them are conical, others fungiform. Each papilla is formed of capillary vessels and a nerve. Different functions are attributed to the different papillæ.

"The hyoglossus muscle arises from the cornu of the hyoid

bone, and is inserted into the sides of the tongue, some of the fibers reaching to its tip.

"The geniohyoglossus muscle; origin by a tubercle behind the symphysis of the lower jaw, and is inserted through the entire length of the tongue into the hyoid bone.

"The lingualis muscle arises from the yellow tissue at the root, and is inserted in the tip between the two first-mentioned muscles.

"Superficialis linguæ.—This is an indistinct layer of muscular fiber on the dorsum of the tongue, under the mucous membrane. It seems to curl the organ upward.

"Transversales linguæ are scattered fibers which pass from the middle line to the edges. They extend from the tip to the root and their contractions lengthen the tongue.

"Verticales Linguæ. These are fibers which extend from the upper surface to the lower.

"The tongue is supplied by the lingual artery. The nerves are the hyoglossal, which is distributed to its muscles; the lingual or gustatory branch of the fifth, which supplies the papillæ and mucous membrane of the fore part and sides; and the lingual branch of the glossopharyngeal division of the eighth, which sends filaments to the papillæ maximæ, and to the mucous membrane near the base of the tongue."

Does not this simple, unexciting description of a part of the field in which we work appeal to you as something we have seen at least in our dreams, or have heard of somtime or another? A sort of atavistic realization of the memorizing exercises of our grandfathers' student days?

I think it is true that we seldom scrutinize the tongue unless in such cases as soreness, induced by its onslaught of offending sharp edges of worn or broken-down teeth. Then we remedy the evil, only as a matter of course, taking no thought or pleasure in the contemplation of its symmetrical beauty, facility of movement and its indomitable energy in performing the various official duties exacted of it, as detective, guardian, governor, executive; in fact, general manager of the province to which it has been assigned. Indeed, the tongue has really much more to do than merely to decide on the taste of things, or to assist in modulating the gift of speech, and in the act of deglutition. To us it is an unmitigated nuisance, butting in when and where we do not want it, and so

interfering with our plans, and sorely testing our patience; but in these cases it is doing only what it understands to be its duty. Besides, we should remember that it is our best friend, in that it detects incipient imperfections in our department, and thus compels its owner to come to us, and then it points out the places we should search. Let us also remember that without its governing presence in the mouth it would be useless for us to construct artificial teeth, for the practiced tongue does much more than it gets credit for, in keeping these substitutes in proper subjection.

But aside from these protean intrinsic values of the tongue, there are many signs radiating from its surface indicative of trouble elsewhere, or of secret habits that obtain in the individual.

Were it not that clinical observation of the tongue has been sadly neglected in modern medicine, perhaps the alienists of today might find evidence pro and con in noting certain peculiarities of its anatomy, such as dilatation of the ranine artery and vein, which suggested in ancient times cerebral congestion and lack of mental equilibrium, by which they might base their opinions on something definite and tangible.

It is interesting to observe the changing colors from pink to purple, in cocainism; and the pale, sickly tip in morphinism, and the wrinkles of the dorsal mucous membrane of those who indulge too freely and continuously in the liquids that possess ethyl hydroxid, C_2H_5OH, (alcohol), as their active principle.

Again, were it not that time forbids, we could reflect, perhaps with profit, on the various adjectives applied to this most remarkable organ; as, for instance, the golden tongue of St. Ambrose; the silver tongue of some of our Kentucky orators; the wagging tongue of gossips; the whispering tongue of scandal; the mocking tongue; the vicious, the libelous, the lying, the dull, the sharp, the obscene, the vulgar, the profane, the fluent, the loquacious, the silent, the wise and the kindly, to say nothing of the dozens of synonyms derived from it. Sufficient to say that the tongue itself is not the responsible origin of these adjectives. It is, as it were, the helpless victim, compelled to obey the dominant mind of a depraved nature; or, happily, a willing instrument by which words of hope, confidence, love and charity brighten and bless the world.—*Dental Summary.*

INDIVIDUALITY IN PORCELAIN CROWN WORK. By J. M. Thompson, D.D.S., Detroit, Mich. When the profession of dentistry awakened to the fact that it wanted porcelain, it was produced in various forms, and we now have at our command materials from which beautiful results may be obtained.

The same thing will happen when we arise in our might and demand natural shapes in artificial teeth and competent buyers in the depots who have the selecting of this particular stock.

The dealers are always willing to supply goods at a reasonable profit, and the teeth now obtainable are offered because they supply the general demand.

The dentist is the middleman, if you please, and it is to him that the public looks, not to the manufacturer. It is this responsibility that demands of us careful study of the needs of the individual, and not of the masses.

Our results in time give us our standing, and it is with a desire to plead for a high standard for all that I have selected the title of this paper.

In treating this subject not only is the individuality of the operator considered, but each tooth must be treated as an individual, a member of a group of individuals, so to speak. This group in its normal state gives character to the person possessing it, and much depends upon its being preserved.

Many attempts to improve upon conditions found in some mouths often result in a less desirable appearance, owing to the lack of artistic sense in the operator, or to his limited knowledge of methods which may be applied to the case requiring his services.

Individuality of the operator is expressed in the degree of knowledge exhibited in the construction and artistic completion of a given case.

Perfect construction demands ability to assemble materials; also, a thorough acquaintance with the materials themselves. The artistic sense is displayed in various ways; a rounded surface here and a slope there; a softened outline where needed; proper contact with adjoining teeth; fine shadings of color, and, if necessary, imitating slight imperfections if such are present in adjacent natural crowns. A crown is never more in evidence than when

placed between discolored or malformed natural crowns unless some attention is given to the two last mentioned particulars.

The dentist in this day of progress whose skill is limited to the use of commercial crowns is not living up to his opportunities, as we now have at our disposal fine porcelains with which we are enabled to do more artistic work, and to become more valuable to the communities in which we live. With these materials more so-called worthless roots may be made to do service and testify to the skill of the dentist than any other known to the profession.

The history of the evolution which has taken place in the construction of the crowns during the last forty years is too voluminous to be considered at this time. However, the crown which may be used in the greatest number of cases involves ideas contained in the pivot tooth of Fauchard, the tube crown of Dr. Smith Dodge of New York, the Lawrence or Foster crown, the Mack crown, the Gates-Bonwill, the How, the Weston, the Howland-Perry, the Logan, and the crown introduced by Dr. C. H. Land, known as the platinum jacket crown, the all-porcelain hood and overlap facing.

With slight alterations of space and the use of metal instead of wood for dowels, the tube principle has survived all the others. This is proven by the numerous varieties of detachable post crowns now upon the market.

The crown with a fixed pin is rapidly falling into disuse, and men whose judgment cannot be questioned claim a greater degree of strength for the crown into which a pin may be set with cement; also, that in proportion to the amount of metal baked into a piece of porcelain is the work correspondingly weakened.

The advent of the electric furnace has done more to make good crown work general than any other contrivance used by a dentist. This, with the production of desirable porcelain already mentioned, has at least made it possible to approach the ideal.

General principles pertaining to the construction of crowns have been described in text books and dental magazines for a sufficient number of years to have established the fixed principles.

Modifications of these principles, or some improvement in technique, is, therefore, all that writers of this period should lay claim to, and if credit for certain improvements is claimed, it should be

done after first mentioning the originator of the crown modified. Original ideas are not always new ideas, and unless one is familiar with all that has been written, he makes a mistake in claiming for for his own ideas that may be from twenty to a hundred years old.

The office-made crowns of a few years ago consisted of an iridioplatinum dowel, a platinum cap or cope, through which the dowel extended far enough to enable one to solder the pins of a facing to it, or, by careful adjusting, bend the pins around it, thus holding it in place during the adding of the porcelain forming the lingual surface (Fig. 1). In selected cases this crown was good, but for general use was decidedly lacking.

In the first place, to be absolutely sure of the parts being

FIG. 1.

FIG. 2.

properly assembled, it was necessary to invest and solder with pure gold; this not only consumed time, but added an element which later on proved a detriment, as the gold used in soldering would unite with, or be melted into, the porcelain and a weak spot formed near the post where strength was most needed; it also limited to quite an extent the artistic results. Secondly, the platinum pins were, and are still, a menace to the success of the crown because of their liability to split the facing when work is placed in a warm furnace.

The use of a poor grade, or of a low fusing porcelain, upon the backs of facings is another source of trouble, and those who have tried it will admit that there is always an uncertain feeling as to the future of the work.

The advantages in the use of office-made crowns are many. The two principal features which present themselves are the adapting

of the crown to the root, and not the root to the crown (as it is often found necessary in the use of a crown with a fixed pin), thus securing a greater degree of accuracy and individuality.

Fig. 2 shows the simplest method of mounting a commercial crown upon a platinum base when a crown with a fixed pin is desired. An iridioplatinum post is fitted into the root so that it has an equal bearing in all directions, which insures strength with a small amount of cement. When this is done it is removed and a disk of platinum placed over the end of the root, through which

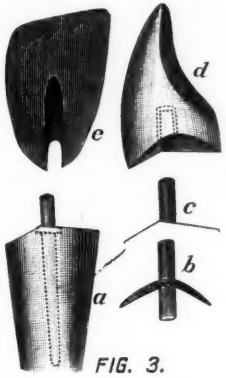

FIG. 3.

the pin is again forced into position. The two are then removed and united with a pellet of pure gold. Having done this and having placed the work in position, a slight blow with the mallet will seat the post firmly, so that the disk is easily swaged or malleted to fit the surface of the root. The part of the post remaining outside is then cut to the length necessary for attaching the crown.

A convenient swager is readily made by the use of a new lead-pencil with a rubber eraser attached. By boring a hole in the eraser to accommodate the end of the post, the rubber comes in contact with the platinum disk, forcing it to conform to the shape of the root. A cone socket handle also makes a good instrument with which to hold work in place.

When the base has been properly fitted a Davis crown is adjusted, and when ready for the new porcelain a little of the body mixed very thin is placed in the hole for the post and the

crown forced into position. This crown may be completed in one baking.

Fig. 3 shows a method of mounting a detachable post crown, the technique of which is as follows: Prepare the root with facer to the desired shape, as shown in Fig. 3a, and with a suitable reamer enlarge the root canal so that it will accommodate a Davis crown pin in its strongest portion. With a large inverted-cone bur, or counter bore, make a countersink to accommodate the flange so that it will be flush with the end of the root (Fig. 3a). This will give added stability to the pin.

For a foundation take a disk of 40 gauge platinum, and with a plate punch make a hole which may be enlarged with a tapered mandrel. Adjust the disk to the post to make sure that the hole is sufficiently large to allow room for a thin platinum tube. Now, take the mandrel and wind a strip of inlay foil upon it and form a tube. Without removing tube from mandrel pass it through the hole in the disk, made by the same instrument, until it fits the opening perfectly. Gently remove the mandrel and solder the tube to the disk with a small scrap of pure gold. With sharp scissors remove the part of the tube remaining upon the root side of the disk (Fig. 3b), and then it is ready for use.

Take the base thus prepared (Fig. 3c) and adjust it to the end of the root carefully, malleting and swaging it to every part of it, and trimming to conform to the periphery, allowing it to extend a little over the borders so that the edge may be turned up if possible. Having done this, take the crown selected for the case and grind it mesiodistally, as in Fig. 3d, and adjust to the base so that the gingival portion will rest upon the platinum.

Owing to the tendency of the platinum to be drawn out of shape by the porcelain, it is always advisable, when possible, to have the crown rest upon the cap or cope, both labially and lingually. However, if in adjusting the crown this is found to be difficult, let the labial border receive the attention.

For anterior teeth Davis crowns are best adapted to all cases, but for bicuspids, diatoric teeth are preferable. These teeth supply bodies of porcelain (without platinum pins) of the approximate size, shape and color of the tooth we wish to restore. I am glad to know that it is now possible for the busy crown work-

ers to obtain pinless facings in quantities. In assembling the parts of this crown, all that is necessary is to force the crown down over the tube, and the closeness of the fit will enable one to remove them as one piece, after which the adding of the porcelain is a simple matter.

In more difficult cases it is sometimes necessary to change the shape of the crown; it may be too wide, or the hole for the pin may not be located in a suitable position, thus preventing proper adjustment. When these difficulties are met, matters are somewhat facilitated by removing with excising forceps part of the lingual portion, and then with a seven-eighths knife-edge stone open into and enlarge the opening for the post (Fig. 3e). By carefully

FIG. 4.

FIG. 5.

grinding this opening so that it firmly grasps the tube, and also rests securely upon the platinum base, the parts may be removed, all saliva and mucus washed from them, and then reassembled without fear of their being misplaced.

In assembling the parts they may be held in the fingers, or by pliers, and a small quantity of porcelain added for the purpose of tacking them together. Work is then placed in the furnace and a union made, after which the crown may be adjusted for the final fitting and shaping.

In producing a crown which calls for extensive shaping, the pinless facing, or the ordinary facing, offer a greater variety of molds and colors, and may be used just as easily as the Davis crowns.

Your attention is now called to Figs. 4 and 5, which explain

themselves. We have two small posts set in this root, which may be of platinoid, or iridioplatinum, and may be either square or round, or may be made in one piece from three-cornered iridioplatinum wire bent to fit each root in such a manner that a flat surface is presented buccolingually, which will form a dove-tail space between the parts extending from the root. The technique pertaining to the construction of the bicuspid crown is identical with that pertaining to the crowns already described, except that a mandrel shaped purposely for enlarging the hole in the platinum disk is used instead of a round one. It is often more satisfactory to work from a model than to do the work directly upon the root.

FIG. 6.

More shapely crowns may be produced by working upon a model, as we are able to obtain a more perfect occlusion.

The use of biscuited teeth in the construction of molar crowns facilitates the work in a marked degree. These teeth may be obtained by special order at a moderate price, and medium shades and colors, such as meet the general demand, may be kept on hand.

In the use of these teeth we obtain better forms than the average dentist is able to make for himself, and, besides, the porcelain is molded under pressure and produces a finer finish. The points wherein they facilitate matters are that they are easily shaped before fusing, and that when fused they may be adjusted to foundations prepared for them, and the space filled in as in other crowns. Fig. 6 shows one of these biscuited teeth, which you will see is nothing more than a veneer, and I trust explains itself.

The tube crown is so closely related to the all-porcelain hood

or jacket crown that much of the technique of one may be used for the other. For beautiful adaptation, the overlap facing and the entire porcelain jacket are in a class by themselves, and in these days of a growing demand for oral prophylaxis, we must study to produce crowns which will not in any way irritate the mucous membrane surrounding them, nor afford a lodgment for soft deposits of any kind. With these ideas in mind I wish to present for your careful inspection and criticism a modification of a jacket crown for pulpless teeth. This crown may or may not have the

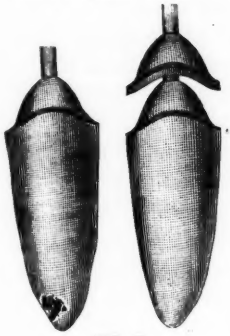

FIG. 7

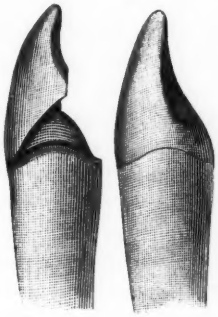

FIG. 8.

post baked into it, and the use of the post is simply for adding strength to the root.

The technique is as follows: Instead of cutting the tooth off to the gum line, prepare it in a manner that will leave a stub, over which a platinum tube may be fitted. With burs and stones establish a distinct shoulder (Fig. 7). Enlarge root canal and fit an iridioplatinum post, allowing it to extend a short distance outside the stub. Now prepare a tube of platinum, and be sure that it passes under the gum and extends far enough over the shoulder, so that in burnishing it will not be drawn away from the edge of the shoulder; burnish the platinum to an accurate fit, enveloping both post and root.

If it seems best to have the post baked into the crown, the platinum and post are grasped firmly with pliers and removed from the root and soldered with a small piece of pure gold. The cap and post are then replaced and given a final burnishing, especial care being given to the outline of the shoulder. A Davis

crown or a facing may be fitted to the cap and post, and finished in the same manner as a jacket crown (Fig. 8).

We now have a post crown, not unlike a Logan crown, yet with all the beautiful adjustment and finish of a jacket crown. I feel justified in claiming for it the highest place in the list of crowns for pulpless teeth. Compare it with the ordinary results obtained with any of the commercial crowns and render your own verdict.

Dr. C. H. Land has introduced a moldable porcelain that is a great aid in porcelain crown work. This material is made by a process which combines any of the commercial porcelains with gum chicle. This gum gives the plastic consistency and will burn out, leaving the work as formed, and many beautiful, as well as practical, things may be made with it.

In assembling parts of crowns, this moldable material is a great help, as being practically impervious it may be used in the mouth without danger of injury from the saliva. After considerable use I am glad to report good results with it.

In adjusting a facing to a tube or post by making a jelly mass (which is obtained by mixing it with chloroform), and placing it upon the back of the facing, and then pressing the facing into position, the mass soon hardens and will hold the facing and foundation together, allowing their removal as a whole. When this is accomplished the crown is laid face down upon a slab, upon which a little bed of powdered silex has been formed. It is then placed near the door of the furnace and the gum burned out, after which it is placed in the muffle and given a high biscuit. The facing will not be injured at all in this way, and the parts are less liable to change their position. The work is then completed with a plain porcelain body.—*Items of Interest.*

THE TRANSITION FROM THE DECIDUOUS TO THE PERMANENT DENTITION. By Charles R. Turner, D.D.S., M.D., Philadelphia, Pa. The establishment of the normal adult denture which is to perform its various functions during the life of the individual is the goal toward which tend many of the processes of growth and development taking place in and about the jaws. This is the mechanism which through the greater por-

tion of the average life is to prepare, for subsequent stages in the digestive process, the various foodstuffs which are taken into the body economy. Its establishment is by a process of building so intricate, and yet normally so well ordered, as to be one of the most wonderful facts of the human organism. The necessity for the highest degree of functional efficiency for this apparatus is a condition so obvious as to require no argument—indeed, we have only to reflect that it is the *raison d'être* of dentistry. As it is the province of the operative dentist to keep the individual members of the denture in repair, and of the prosthetist to provide for losses in its integrity, so it should be the function of the general practitioner to insure the correct positioning of the individual teeth as they erupt and take their place in the denture. Someone has very aptly said that he should be the accoucheur, as it were, at the birth of each tooth, nothing being required of him so long as the normal orderly progression of events in the formation of the denture continues, but he must be ready to step in as soon as any departure from normality occurs, and either render or have rendered such service as will continue the denture formation to its completion. So closely related are the events which result in the construction of the perfect natural denture, and so dependent is each one upon those which have preceded, that even the smallest irregularities in this course of events, even those which in themselves are hardly abnormal, may, if uncorrected, lead to forms of malocclusion which seriously impair the usefulness of the denture. And the fact has been so well established as to be now almost common knowledge that the correction of such aberrations at the proper development period oftentimes restores the normal progression of events.

I do not wish to attempt to take any of the laurels so justly awarded to modern orthodontia since the occlusal relationship of the teeth has been the standard toward which it has worked. The results of its ministrations are beautiful, brilliant, and in an increasing number of cases all that can be desired. And there will ever be a constant demand for its skilful service. But I do maintain that in addition to the serious abnormalities in denture development which result from mouth-breathing and other pathologic conditions for which the service of the orthodontist is imperative, many, very many, of the established forms of malocclu-

sion which come into his hands could have been converted into cases of correct occlusion had judicious management been exercised during the period of the change from the deciduous to the permanent denture. And, furthermore, I believe it to be capable of demonstration that in many of the class of well-established cases, the orthodontist is unable, not by lack of skill, but physically he is unable to produce a denture of the high degree of functional efficiency which its normal development would have provided.

Characteristics of the Ideal Denture and Their Relations to Its Function.—As a background for the argument which I propose to adduce in support of this contention, let me remind you of some familiar facts concerning the useful purposes of the human denture, and some of the characteristics of those which nearly approach the ideal in mechanical design. It is necessary to remember that while a typal design for the masticating apparatus that is ideal from the standpoint of mechanics and is perfect as a machine-made mechanism is only an ideal so far as the natural denture is concerned, it is easily demonstrable that nearness of approach to this ideal means proportionate increase in functional efficiency.

The thirty-two teeth are divided equally in number between the upper and lower jaws. They are arranged in two arch-shaped series, which may be brought into contact by the movement of the mandible. Each tooth has a definite position in its own series and definite relations with its opponents when the teeth are in occlusal contact, and is an integral part of the denture. Inasmuch as the denture functionates as a whole, we can consider the teeth collectively and point out what bearing the relative arrangements of its separate parts have upon its efficiency.

In the process of mastication, as is well known, the mandible executes various movements, all of which ultimately reach a position in which the teeth are in the occlusal relation. In the vertical, or lateral, or forward movements of the jaw, it is in the return to the position of occlusion that the comminution of the food takes place. It is obvious, therefore, that there is some definite relationship of these occlusal surfaces which provides for the highest degree of crushing efficiency. What this relationship is is also so well known as to require no special comment, and we are ac-

customed to term it the normal occlusion of teeth. We know that in this arrangement, if we consider the molar and bicuspid teeth collectively, we have a series of cusps and fossæ, and that one row of cusps of both upper and lower series fits into the fossæ between the cusps of the opposing series.

In moving into the position of occlusion, the food is crushed as each cusp slides into its fossa, clearance spaces being provided for the escape of the food. Just to the degree that a natural denture is lacking in the fitting of cusp into fossa, either from tooth-loss or from malocclusion, just to that degree is it lacking in functional efficiency.

But it is not only at the moment of reaching the occlusal position that the crushing is done, but also during those movements of the mandible in which the teeth are in contact and the cusps are sliding down the walls of the fossæ into which they fit. The mandible is brought into the occlusal position in mastication either from a depressed position or from its forward or lateral excursion, and usually from a position caused by a combination of several of these movements, and the first contact of the teeth is not that of the position of occlusion, but usually they touch with the mandible either forward or to one side of this position, and the mandible is then drawn by the levators into the occlusal relation. During this phase of the mandibular excursion the teeth preserve a sliding contact, the cusps slide down the walls of the fossæ into which they fit, and we have what has been called a triturating movement. It is well known—and Dr. Joseph Head has definitely shown—how much this triturating movement excels in efficiency the mere crushing movement of ordinary closure of the jaw. It is obvious, therefore, that the occlusal surfaces must have not only definite relations in the position of occlusion, but also during those movements of the mandible in which the teeth are in contact. In the ideal mechanism this is provided for by these characteristics: The curve occupied by the occlusal surfaces of the molar and bicuspid series, usually known as the curve of Spee; the relative positions of their buccal and lingual cusps; and the form of the glenoid fossæ, determining the path of the mandibular condyles. The harmonious interrelation of these three is, of course, necessary.

The curve of Spee is that assumed by the summits of either the

buccal or lingual cusps of each series, and is the arc of a circle. In its ideal form, when continued backward, it passes just anterior to the face of the condyle and is continued in the glenoid fossa. Christensen has shown how it may either have this form, or the path pursued by the condyle may be the arc of a circle concentric with it. In either event this form of arc provides for a sliding contact of the teeth as the jaw moves forward or backward, each cusp sliding upon the wall of its fossa as the mandible moves, its distal end moving harmoniously therewith as determined by the condyle path.

In the lateral excursion of the jaw, one condyle remains in its fossa, the other moving downward, forward and inward. The teeth on the side from which movement is taking place are therefore lowered in vertical position, and to provide for the contact of the cusps there is a progressive lowering of the lingual cusps of each series as we go backward in the mouth. Walker has pointed out that unless this arrangement of the teeth exists they will be separated on the side from which the movement takes place. While it is true that the most effective mastication occurs only on one side at a time, yet some crushing does occur on the other, and simultaneous contact of both sides of the denture prevents its overstrain. It is evident that these three characteristics of the denture are related, and although they vary much in different dentures, they vary harmoniously and in a related manner. To be most effective for purposes of mastication, then, the individual tooth of a denture must be grouped to accord with this plan, and the more nearly they approach the ideal in this direction the more efficient for mastication will be the denture.

The Establishment of the Deciduous Denture.—Having reminded you of the characteristics of a natural denture which will make it most efficient from a functional standpoint, I desire to ask your attention to some details in its mechanical genesis. And, despite the fact that it is only with the permanent denture that we are dealing, the establishment of the deciduous denture illustrates many fundamental and related facts.

We remember that about the fortieth or forty-fifth day of embryonal life there is a dipping down of the oral epithelium, and about the forty-eighth day a budding of this to form the enamel organs of the deciduous teeth. About the fifth month of intra-

uterine life there is a budding from the lingual side of the enamel cord of the deciduous tooth germs to form the germs of their permanent successors and of the first permanent molar, while the germ of the second appears about the seventh to the eighth month, and that of the third molar about the third year of life. It will be noted that the permanent tooth germs occupy a position below and to the lingual side of their predecessors. About the twelfth or fifteenth week the alveolar process sends in shoots to differentiate the sockets of the teeth. The alveolar process is developing, but the bony crypts for the deciduous teeth are not now or later covered in. At birth we have the partially formed crowns of incisors, cuspids and molars, and the developing first permanent molar is just appearing.

About the sixth month the eruption of the teeth begins. The theory of Constant as to this phenomenon seems to be most generally accepted. He attributes it to blood pressure in the papilla and underlying mesoblastic tissue, and not to the increasing length of the root of the tooth, as many have maintained. The incorrectness of the latter theory seems to be amply demonstrated when one reflects that at the time of eruption little or none of the root is formed, and Tomes has reminded us that in the upper permanent cuspid the root is almost entirely formed before the tooth erupts. At any rate it is by a *vis a tergo* that the cone-shaped crown is forced toward the mucous membrane.

No bone has to be absorbed ahead of the crown, the bony crypt going upward with its contained tooth, its upper rim being broken down, the pericemental fibers being attached in increasing numbers below. It is plain to see how easily such a tooth can be deflected from its path by the least obstacle, and how important it is that all the guiding influences of tongue and lip pressure be supplied. It is little short of remarkable that these first two teeth, the lower central incisors, should come to occupy an exact position in the mouth. The upper central incisors follow, and the contact with the lower incisors assists the factors already mentioned in giving them a correct location. The lower lateral incisors and those for the upper jaw are next in order, and for each of these there is the guiding influence of the teeth that have preceded to prevent their occupying a position too far toward the mesial. The first deciduous molars erupt and take their place, and then we

have established the bite or distance between the jaws. The cuspids erupt into a space left for them, and finally the second molars, about the beginning of the third year, complete the deciduous teeth. At this time the crown of the first permanent molar is almost entirely formed, and there are now under way portions of the crowns of those permanent teeth which have deciduous predecessors. The deciduous teeth are placed with their long axes nearly vertical, and the plane of occlusion is nearly flat and horizontal. This is because of the growth in the body of the alveolar process, which is rendered necessary by the developing crowns of the permanent teeth. The glenoid fossa is but a depression in the temporal bone. The alveolar process has developed to keep pace with the increase in length of the tooth roots, and to accommodate the unerupted crowns of the permanent teeth the ramus of the mandible has elongated, and there is an interstitial growth in the maxilla and mandible to broaden them. This interstitial growth is coincident with that in other bones in the body; but it must not be forgotten that the growth in the alveolar process is of a different nature, occurring about the roots of the teeth and only taking place when the stimulation from that source exists.

It is a generally observed fact that the teeth of the deciduous denture are regular in alignment and occlude properly in a high percentage of cases. The exceptions to this are distinctly to be rated among the unusual occurrences. In attempting to account for this we do not meet serious difficulty, although it must be evident to even the casual observer that, in a process so delicate, slight obstruction might be sufficient to disarrange the plan. The occlusal position of each tooth depends, first, upon the proper positioning of its germ and its maintenance in proper position in the bone until the time of eruption. Then in its eruption it is plain to see that little obstruction is offered; not even a covering of bone has to be absorbed ahead of it. Once started correctly on its way, however, even with the tongue and lips to guide it, this cone-shaped body might be easily deflected from its correct path, but after the first pair of teeth erupt it is further guided by those which are already in position. Thus the correct location of the deciduous teeth is not hard to understand.

The Transition to the Permanent Denture.—After a period of

about four years the change to the permanent dentition begins, and it must be remembered that this occurs gradually and without interruption of the masticatory processes, which have now been established. The deciduous denture is a comparatively simple apparatus as compared with the permanent one, and the ground held by the former must be cleared before the latter can take its place. The process of building is more intricate and is beset with greater difficulties.

Among the first questions which have to be dealt with is that of maintaining a correct distance between the jaws. Now that the apparatus is being used for masticatory purposes and the lower jaw is pounding away upon the upper, there must be some support between the two while the change is occurring. This has been most wisely provided for in the eruption of the first molar and the formation of its occlusion with its opponent before the deciduous teeth are exfoliated.

The importance of securing a correct relationship for these teeth has been so ably established by Bogue and many others as to require no additional emphasis. As these teeth have no deciduous predecessors they pursue an unobstructed path, and in the normal condition of affairs lock in their well-known relationship. The fact must not be lost sight of, however, that alone they cannot maintain the jaws the proper distance apart, but must be assisted by the deciduous teeth until additional support is derived from the other teeth of the permanent series.

Another necessary characteristic of a correct natural denture is established in this interlocking of the first molars, and one that is also equally well known. This is the correct mesiodistal relation of the arches. The orthodontists have amply demonstrated the importance of this, as well as shown that the normal arrangement of succeeding teeth is impossible without it.

The crowns of the other permanent teeth occupy positions on the lingual side of their predecessors, the bicuspids being placed normally below the deciduous molars. The crowns of the former are larger than their deciduous analogs, and they cannot all erupt at the same time, and the jaws must be expanded to accommodate them. This is accomplished by a growth in the body of both maxilla and mandible, while to accommodate the lengthened bite of the permanent denture the ramus of the lower jaw must

further elongate. The jaws anterior to the first molar must increase about three-fifths to accommodate the permanent teeth.

In order that when the permanent teeth have taken their places they shall have correct occlusal positions, and their relative positions in each arch shall be correct, each deciduous tooth must remain in position until its successor is about to erupt, and then it must be normally exfoliated to give place to it. This is necessary because of the support which it gives to the teeth distal to it and also because the alveolar process will otherwise have its development interfered with, and the occlusal level of the succeeding tooth will be affected.

Although normally the alveolus expands just before the eruption of the permanent teeth because of their increase in size, it is not large enough to contain them were they to erupt all at once. The separations noted between the anterior deciduous teeth about the sixth year indicate that they are being pushed labially by the expanding alveolus and the oncoming teeth.

The lower central incisors first appear, erupting in a lingual position in the jaw. The upper central incisors which follow usually erupt in a labial position, dissection showing an absorption of the alveolar plate over much of their labial surfaces. The laterals follow, those in the lower jaw usually being a little lingually placed and being later forced out by the tongue, while those in the maxilla very often have their long axes inclined outwardly. Then in the lower jaw usually the cuspid, and in the upper and lower the bicuspids, follow in order, back to the first molar. The upper second bicuspid sometimes succeeds the cuspid, and the order is slightly variable. It is worthy of note that the lower second bicuspid has the same vertical relation with the mental foramen, which was occupied by the second deciduous molar, so that the mandible has expanded anterior to this to accommodate the increased size of the adult teeth. Cryer has confirmed this assertion of Tomes by pointing out the recurving of the inferior dental canal to reach this opening, which occurs as the bone grows in this position.

The upper cuspid is erupted with almost all of its root calcified. It moves in a line along its own axis, and after it erupts it is less easily deflected than any of the teeth. This takes the denture formation up to about the twelfth year, and during this period

we have the jaws widening because of interstitial growth, and the bite is lengthened because of increased growth of the alveolar process to accommodate the forming roots of the teeth. The bicuspids and first molar are carried outward and get their correct incline by a widening of the jaws. At this period the glenoid fossa is but slightly developed, but begins to show a perceptible downward inclination. It must not be lost sight of that during this period of growth the developing structures are more or less easily influenced by extraneous factors.

From this period to the end of denture formation we have to develop the curve of Spee and the correct relation between the buccal and lingual cusps of the molars which follow. The maxillary and mandibular molars are arranged in the jaw, and come down in succession. The upper molars face backward and downward, the lower ones upward and forward. Their anterior position is determined by the mesial neighbor, and as each pair erupts and comes into occlusal relations it is approximately in the curve of Spee. The nature of the jaw movement and the positions of these teeth react upon each other, so that minor departures from the plan in either direction are corrected.

The proper relation of the buccal and lingual cusps of the upper and lower teeth is established by a widening of the lower jaw without a corresponding widening of the upper. The upper teeth are inclined outward while the lower are inclined inward. This fact, together with the actual anatomic difference in the size of their buccal and lingual cusps, establishes this characteristic of the ideal denture, and here the lateral excursions of the jaw have the same corrective influence upon this arrangement of the teeth.

In order for the teeth to assume exactly this position it is necessary that all of the processes of denture formation which have preceded shall have been properly completed, and also that the coincident growth of the bodies of the maxilla and mandible shall have occurred.

It must also be stated that after the completion of the root formation of any tooth, its position is practically uninfluenced by any of the normal conditions in the mouth. In order, therefore, to take advantage of the corrective influences of nature,

a departure from the normal must receive attention early in its existence. The slightly abnormal position of any tooth soon becomes fixed for that tooth unless it be corrected, and after a short time it requires a correction of the whole process to return the tooth to a normal position. It should therefore be the duty of a general practitioner to see that the normal process of denture development continues without interruption, or he must correct immediately slight departures from the orderly progression of events.

We call your attention to a few cases with which the orthodontist will have difficulty.

While such a result does not fortunately obtain in all cases, yet we have doubtless all seen instances in which the expansion of a much-contracted upper arch after the age of fourteen or fifteen results in establishing the lingual cusps of the upper teeth in their correct fossæ in the lower teeth, but their long axes are so inclined that the buccal cusps are not in functional relation. If this had been done earlier in life the lateral expansion of the upper maxillary bones would have righted these teeth, but when the processes of growth here are practically completed this cannot be expected.

Again, how easy is it to interfere with the curve of Spee by a movement of the distal teeth with the Baker reciprocal anchorage after the time when the molars should be in position! And what orthodontist does not know the difficulties of establishing a correct bite if this has been interfered with, and is either too long or too short? Denture development, as already emphasized, must be a correct progression of events. These facts, I believe, give increased significance to the importance of an orderly arrangement of the denture in order to secure its highest efficiency as a mechanical apparatus.—*Dental Cosmos.*

CAOUTCHOUC AND GUTTAPERCHA. By L. T. Canfield, D.D.S., Toledo, Ohio. I shall endeavor to give you some history and general information, chemical and physical properties, manufacturing, mixing, compounding, etc., of guttapercha, and in so doing it will be necessary to take into consideration india-rubber or caoutchouc.

Of all the important trees which were made known to us by

the great discoveries of the 15th and 16th centuries the rubber and guttapercha trees are those whose extraordinary value has been recognized only in the latter half of the 19th century. Columbus was acquainted with the peculiar properties of a few rubber-producing plants and mentioned these in his reports, but there was a lapse of over three hundred years before a proper use was made of this valuable material, which is now the basis of great industries. Even then the employment of the material increased slowly, and it was put to many other and quite different purposes than those which have been found useful in later times.

The year 1839 marks the turning point in the history of caoutchouc; since then the employment of it has steadily increased and the progress of the trade has been phenomenal, new uses being constantly found for the material, until today there hardly exists a product of nature which is more universally employed than guttapercha and caoutchouc. With the growing industrial use the trade in crude material naturally also increased, and is now one of the most important raw products in the world's market. The planting of trees and the collection of raw material has also become one of the foremost colonial problems, and will undoubtedly prove to be an excellent source of profit for tropical and semi-tropical climates.

The material was first mentioned in the literary history by Gonzalo Funandes in 1836. He describes the batos game of the Indians, which is like a game of ball, although played differently, and the balls were somewhat different than those used by the "Christians."

Juan de Torquemada, in 1615, mentions these elastic balls and gives the tree which produces the material the name ule tree, which is still in use by the natives of Mexico.

The Spanish conquerors used the material for painting their linen coats to protect themselves against rain. The water did not penetrate, but the sun rays had an evil effect on these garments. In the meantime a few samples of the material had been brought to Europe and graced the collections of the curio hunters of that time. The samples were very expensive, one guinea being paid for an ounce.

Two Frenchmen, the scientist, Chas. de la Condamine and the

engineer, Fusman, must be credited with having made known the new product and fixed its real origin.

These Frenchmen induced the French botanist, Fusel Aublet, in 1726, to go to Guiana. Two years later he published a work in which the caoutchouc tree is described from a botanical point of view. During the time the botanists were employed in finding the origin of the plants, the chemists were studying the new resin, and at last succeeded in dissolving it, and in 1768 presented the Paris academy with a report upon the results of their researches, and recommended turpentine, pure ether and dippel oil as a means to dissolve the resins, which were not affected by water and alcohol. They suggested at the same time the usefulness of the gum for the production of medical probes and small tubes. The English chemist, Priestley, in 1770 drew the attention of English scientists to the use of caoutchouc, and recommended the material for rubbing out pencil marks.

In 1772 it was introduced by Magellan, in small cubes, for this purpose and sold in stationery shops. The word "india-rubber" thus found its origin and this use has been retained to the present day.

Along in 1780 Drossart made known a method of making tubes, bottles and other goods for surgical use. Besson (in 1791), Johnson (in 1797), Champion (in 1811) and Clark (in 1815) tried but did not succeed in making a caoutchouc solution for the purpose of waterproofing garments. In 1823 Chas. Mackintosh used benzin for the dissolving of caoutchouc, and by this he created the waterproof industry, which has been named after the inventor.

In 1832 Chaffee and Haskins, of New York, founded the Roxbury India Rubber Co., with a capital of three hundred thousand, which was later increased to four hundred thousand for the purpose of turning out waterproof garments. They produced large quantities, but the products did not prove satisfactory and the firm was forced to accept the return of the goods. These difficulties were partly overcome in 1836 when Thos. Hancock found that caoutchouc energetically worked under high temperature became a very tough material and could be moulded into any shape or form desired. The industry was very precarious

until the year 1839, when Goodyear succeeded in solving the question and produced with caoutchouc and sulphur a material which did not break at a low, and, did not become sticky at a high, temperature. Goodyear took his first ideas from the Roxbury company, in whose interest he started his researches. He worked with all the energy of an inventor to gain a solution to the problem. Although, at first, he did not lack financial support, and even later found ready pecuniary help to further his investigations, in the end he expended his whole fortune in the search, being reduced to such a condition that his family lacked the necessaries of life. It took him over ten years to find the right method, but at last he was able to present to the world a most valuable invention. Goodyear's method consisted in mixing the caoutchouc with pulverized sulphur and subjecting the mixture to a high temperature. The process is called "vulcanization" and the caoutchouc thus treated becomes "vulcanized rubber." The last invention of Goodyear, of great importance, was his method of making hard rubber by increasing the amount of sulphur in the caoutchouc before vulcanizing it. Thus we have our dental rubber.

Caoutchouc is a vegetable hydrocarbon from the sap secreted by the protoplasm of the so-called intercellular veins of a large number of trees growing in tropical countries. The principal veins of this cellular texture rest in the interior rings of the bark. They send numerous branch veins through the bark toward the exterior. When a cut is made in a rubber tree, a sap, like goats' milk, runs out, which is called "latex." If the sap is properly treated the globules separate and become a firm substance which at first is more or less white. If the latex is left unattended the globules soon separate themselves from the watery fluid and are like cream on milk. It has the density of cream and smells somewhat like amber. The amount of pure caoutchouc contained is fluctuating. The best latex, from Para in Brazil, contains:

Pure caoutchouc	32 per cent.
Albumen and mineral contents	12 per cent.
Water	50 per cent.

Owing to its elastic nature india-rubber lends itself with great

facility to admixture with a variety of substances, both organic and inorganic, and the preparation of rubber compounded with mineral matters forms a large part of the factory routine, and, indeed, in many works none but such compounded goods are turned out. In many cases the main reason for such compounding is the desire to reduce the price. When the difference in price between the rubber and the mineral is so great it is not surprising that close competition has led to the increasing of minerals, meaning a reduction in cost which will easily enable one manufacturer to gain business at the expense of rivals. It has been suggested that the answer to the query, "What is rubber?" may be expressed as follows: "Rubber is an elastic material used for binding together chalk and other materials." Injustice has been done to manufacturers of the front rank by reason of their goods having been compared to others of apparently equal quality sold at a considerably lower price. The accusation as to making exorbitant profits has, in the majority of cases, been entirely unjustified, a fact which would reveal itself to the purchaser if he made careful comparison.

To enumerate the various bodies which are used in compounding would fill a book. We will only give you a few of them, as many are trade secrets. Antimony, asbestos powder, French chalk, magnesium carbonate, magnesium oxid, calcium oxid, lamp-black, letharge, plumbago, red iron oxid, silica, sulphur, vermilion, whiting, white lead, zinc oxid and zinc sulphid. As coloring matter, besides the antimony, lamp-black, red oxid and vermilion mentioned above, cadmium sulphid, arsenic sulphid and various lacs derived from coal tar colors have been used. Coloring matters capable of withstanding the processes of vulcanization are not readily found. As lead chromate loses its color under the influence of sulphur and heat, cadmium sulphid is expensive, while the poisonous nature of arsenic sulphid is a decided bar to its use. With regard to the toxic properties of the coloring matter used in the trade it only becomes of real importance with dental rubber and rubber toys.

Although india-rubber is soluble in many liquids, as far as manufacturing operations are concerned there are only three solvents which call for mention. These are coal-tar naphtha,

petroleum spirit of benzin, and shale naphtha. The first is used to the largest extent, as it is undoubtedly the best solvent. There is a somewhat prevalent idea that india-rubber and guttapercha are practically identical bodies, though this is by no means the case. Not only are the substances yielded by totally different trees, but they also show a wide divergence in their properties and it is only in rare cases that the one can replace the other.

John Trandescant, an English traveler, is credited with having brought the first sample of guttapercha to England in 1656, but it was not until 1832 that the substance really attracted any attention. This was brought about by the investigations into its properties by Wm. Montgomery, a British surgeon of Singapore, which place afterwards became headquarters of a large export industry. In a letter written in 1843 to the medical board at Calcutta he details the advantages which the new body was found to possess over india-rubber for certain surgical purposes. Not long afterwards the botanical side was investigated by Dr. Oxley, the tree being christened by Sir Wm. Hooker "Isonandra Gutta." The substance attracted considerable attention in England and France, various patents being taken out in connection with proposed application. Most of these were doomed to failure, as they did not take into sufficient consideration the physical properties of the substance; these properties, while rendering it eminently superior to rubber for some purposes, being at the same time a bar to its general use in cases where rubber had already established itself in an impregnable position.

Recent research has added largely to the known number of species of trees which yield guttapercha, but the productive area has only been very slightly extended by those botanists and travelers who have made the trees a special object of search. While india-rubber has been shown to occur in a broad equatorial belt, guttapercha is only to be found in a much more restricted area, the total production coming from what may be roughly described as the Straits Settlements and Malay Archipelago; Borneo, Sumatra, the southern end of the Malaccan Peninsula, Java, the Celebes and Sulu Islands being the principal gathering grounds. Dr. Sherman, of the forestry department, in a recent statement says that the gutta trees are abundant in cer-

tain parts of the Philippine Islands. From his furtner remarks there seems little doubt that the substance has long been obtained from the Philippines by Chinese merchants who kept quiet as to its point of origin when they sold it at Singapore.

Full grown trees have the trunk one to two yards in circumference, though the collectors by no means limit their work to those which have attained maturity. The guttapercha, like the caoutchouc, occurs as a milky latex in the bark, and is always obtained by cutting the tree down and allowing the latex to drain into receptacles placed under the cuts. The latex, which is called su su in North Borneo, is coagulated by being poured into boiling water. The whole business is in the hands of native collectors and Chinese merchants and is carried on in an unscientific and wasteful manner. Good and inferior qualities of latex are obtained from different trees; but the experienced collector does not mix them together haphazardly, for they know how to avoid reducing the quality of first class material. Owing to the destructive method of collecting (for not only is the tree felled but large amounts of latex are invariably left in it to be wasted), it has long been clear that a famine is merely a matter of time.

Comparatively little has been done in the way of guttapercha plantations, and the results so far achieved go to show that the cultivation is not only hedged around with difficulties, but also that, compared with rubber, much longer time must elapse before any return is obtained from invested capital.

It is expected that in the Philippines regulations will soon be made whereby collectors will have to obtain licenses and be compelled to conform to procedure calculated to prevent destruction and waste. The raw material comes to us in somewhat different forms, depending upon in what market you buy, how much it has been refined and the price, sometimes in reddish-white lumps of varying sizes containing chips, bits of bark and water. These impurities may be removed sufficiently for common purposes by maceration in hot water. For the firmer mechanical purposes like insulating and our dental work it requires a more thorough cleansing, which is carried out in a special form of washing machine in which it is both shredded and squeezed in warm water, at the bottom of which the impurities collect. It next goes

to the kneading mill, consisting of a fluted shaft revolving in an iron cylinder, and afterwards to a strainer where it is forced through fine wire gauze. The guttapercha, which at the end of these processes should be free from mechanical impurities, water and air, can then be rolled into sheets or any form desired.

It sometimes comes to us partially refined and squeezed into forms somewhat resembling small hams. Guttapercha has a specific gravity just above 1, and in compressed form it will sink in water. Chemically it consists of hydrocarbon, the same formula as india-rubber, with variable quantities; it has two peculiar resins named albane and fluavile.

Payne, who first investigated them, gives the proportions as:

Gutta	78 per cent.
Albani	16 per cent.
Fluavile	6 per cent.

The main feature about guttapercha which distinguishes it sharply from india-rubber is its plasticity under heat. At a temperature of about 100° F. it softens; thus if a piece is put into water which is being gradually heated it gets more and more plastic until at 190° F. it can be moulded or drawn out into forms which it will retain on cooling. In this respect india-rubber behaves quite differently, and this property alone is quite enough to dispose of any idea that they are identical. As regards the action of solvents, acids and of alkalies, the two substances are much the same.

Although to some extent it has a cellular structure, guttapercha is not porous to water as is rubber, and it is this which makes it so valuable for the purposes we apply it in dentistry, also as it is almost entirely used for the insulation of submarine cables. The great bulk of guttapercha going to England finds its way to the great cable works on the Thames.

The golf ball manufacturers probably being the next largest consumers, it has many and varied applications in the arts where it is utilized by chemical manufacturers. Great care is exercised by the cable manufacturers in selecting certain brands and in mixing so as to obtain a material of high insulating power. The procedure followed is the outcome of experience and comes within the category of trade secrets.

There is much guttapercha put upon the market being com-

pounded with mineral matter, thus making it easier to work and much cheaper; the purer the guttapercha, the higher the temperature required to soften it.

The extremely hard guttapercha required for dental stoppings and canal points is accomplished by first selecting the purest of guttapercha, care in refining and reducing the amount of resin by soaking for a certain time in petroleum spirit. In regard to vulcanizing guttapercha one author says it is quite feasible, while another says it is quite impossible. The truth is that inventive genius has produced a so-called vulcanizable guttapercha in which both rubber and guttapercha enter as component parts. Guttapercha must not be brought into contact with a flame, as it ignites quickly and burns with a shower of sparks, leaving a blackish residuum. Cold has but little effect upon it; at several degrees below zero no changes are noticeable. The same can be observed by contact with cold water. It can be preserved best by being kept from atmospheric air and light. When exposed to the sun's rays it becomes brittle and loses its electric resistance.

Guttapercha, when pure, has a specific coloring between pink and grayish-white. It is tasteless and inodorous, and if it smells it is on account of decomposition. The material has a cellular structure, but when firmly stretched it becomes fibrous and is very strong in the direction of the pull. Single pieces are not adhesive under ordinary temperatures, but when heated on the surface and pressed together they adhere and the pieces can not be detached. It can be folded, pulled, tied in a knot and is easily cut by sharp-edged and pointed tools.

The Brazilian Government-Gazette, as quoted in the Daily Consular and Trade, reports the world's production and consumption in 1907 as 67,999 tons production and 62,574 tons consumption. —*Dental Summary.*

BACTERIOLOGY OF PYORRHEA ALVEOLARIS. By Harold Simms, M.D., L.D.S., Manchester, Eng. During the period of the existence of this society the profession of dentistry, like that of medicine itself, has made very great progress, and perhaps this has been most marked on the scientific and especially

the pathologic aspect. It is on this side, too, that our profession most nearly comes into contact with the sister profession of medicine, and our progress professionally has been coincident with the progress of many of the special departments of science which general medicine now brings to its aid. Thus we have progressed in our knowledge along the paths of chemistry, physics, histology and other branches, but this evening my object is to present for your consideration some advances of dental science in the one department of bacteriology, one of the more recent additions to our curriculum, and, as you know, a comparatively new science.

I have not been able to continue my former researches into this subject to any extent recently, and, therefore, this attempt to deal with the present state of our knowledge of bacteria, particularly in relation to pyorrhea, has no claim to originality on my part except for certain limited portions; still I am emboldened to proceed, as I understand that we as a society have not previously had the opportunity of considering this aspect of one of the diseases we are commonly called upon to treat; and, therefore, to some few, at least, the subject is a new one.

Bacteriology is not only a subject difficult to work at, but unfortunately it is of such a highly technical nature, that unless one has had a little experience of it, it is apt to form a rather wearisome subject of discourse; therefore, I shall try to avoid referring to the mass of detail of which the subject consists, and keep to the main facts.

As you are aware, bacteria are a lowly form of life on the borderland between the animal and vegetable kingdoms; for convenience they are classified according to shape into the following varieties:

Cocci—Staphylococci, consisting of clumps.
Diplococci, consisting of pairs.
Streptococci, consisting of rows.
Bacilli—rods.
Vibrios, or comma shapes.
Spirilla.
Thread forms (leptothrix).

Our knowledge of all these forms we derive from their microscopic appearance, from the form they assume when artificially

cultivated on special media, and lastly from the effects that follow their experimental inoculation into various small animals, such as rabbits and guinea pigs.

By observing bacteria under these various conditions we are usually enabled to divide them up fairly accurately, so that we are able to determine to what species any particular organism belongs.

Having made these points clear, we may now pass on to consider that disease or group of diseases to which the name pyorrhea alveolaris has been applied, although alveolaris osteitis or chronic suppurative periodontitis, the alternative terms, are more truly descriptive of the pathology.

As you know, the condition is a very common one, and one moreover that is not confined to human beings, for Colyer has drawn attention to its frequent occurrence both in dogs and horses, especially when these animals are under the artificial conditions incident to captivity. Of all dental diseases this is the one most resistant to treatment, and while opinions differ so widely as to the cause and also the pathology of the disease, it seems hardly likely that our attempts at treatment will be more successful.

With the main features of this affection we are all only too familiar and there are but few points which I need mention.

(1) Probably all *true* cases of pyorrhea start at the free margin of the gum as a simple gingivitis.

(2) The involving of the bony alveolus or socket is a secondary stage, but when this does become affected it disintegrates more rapidly than the gum does, and thus we have formed those recesses or pockets between the gum and the root, that are so characteristic of this disease.

(3) There is a wide diversity among the cases as to whether loss of bony alveolus or suppuration is the predominant feature; those cases where there has been a very great loss of tissue are frequently characterized by comparatively little discharge, and, on the other hand, one sees cases where there is no perceptible loss of tissue at all, but where there is a well-marked discharge. Similarly the presence of tartar is nothing like universal, and nowadays opinion is very strong against this being regarded as a

cause of pyorrhea; when it is present it is almost certainly the result of the early gingivitis.

(4) I need hardly remind you of the marked disposition of the disease to spread both laterally to adjoining teeth, and also to the ones immediately above, with the result that by the time the cases are presented to us, a large number have become involved, and we find every stage from a slight gingivitis to complete exposure of the root and consequent loosening of the tooth.

(5) Complications.

Most of us come across an occasional case where the septic state of the mouth is responsible for some form of constitutional disorder; in some cases this may assume the form of general anemia, and I may say that in every case that has been examined there has been found to be a diminution in the number of red blood corpuscles; this is, as a rule, not very pronounced, and it is seen in other diseases of septic origin.

Some cases of pharyngitis, laryngitis and antral disease have been traced to pyorrhea, but it is much more common for complications to assume the form of disorders of digestion; it is almost surprising that dyspepsia is not more commonly complained of than it is, when one considers the enormous quantities of septic matter that must be taken into the system; the only explanation is that the patient gradually becomes immunized to this autoinoculation and his system becomes, as it were, vaccinated against the effects of the organisms he swallows. Such immunity is, of course, liable to break down at any time, and then, some time when the patient is somewhat run down, there commences one of these troublesome complications, the consequences of which, in some cases, are far from trivial, and in a few cases end in septicemia and death. This fact is very well authenticated, and one such death occurred at Guy's Hospital while I was there, when the patient, suffering primarily from pyorrhea, developed septic glands in the neck, which set up cellulitis; this went on to septic pneumonia, general septicemia, and finally death, and all this was directly attributable simply to the septic condition of the mouth.

For some years research has been going on quietly, attempting to prove that we have to deal with what is called an infective disease, that is, one that is due to the activity of one specific

microorganism; the manner in which the disease gradually spreads is pointed out as resembling other infective diseases, but although there is some ground for this suspicion, no one has yet been able to find any one constant organism, and nowadays we are beginning to come to the opinion that there probably is no *one* special microbe, but that instead there are a number that may be, to some extent, responsible for parts of the disease, and more especially the later parts.

We cannot find any microbe capable of setting up the early gum inflammation, and many still regard this part as being largely the expression of general constitutional disease, as some used to regard the whole of the disease to be.

I have come across cases in which the patients had previously suffered from rheumatism, syphilis, diabetes and gout, but there were many other cases where I was quite unable to trace any of these diseases, and my own opinion is that the influence of constitutional disease has been much overrated, that it ought only to be regarded as to some extent a predisposing factor, and that the ultimate cause will be found to be local.

This subject was one to which the late Prof. Miller paid considerable attention, but he found himself unable to come to any definite conclusions on it, for although he was able to find bacteria capable of causing abscesses to develop in animals, yet no one form of bacteria appeared to be constant, but from the different cases different organisms appeared, and his experience has proved to be a not unusual one.

In describing what we know about the bacteriology it will be convenient to consider it under the following headings:

(1) Direct examination of pus obtained from the pockets.

(2) Experiments at cultivating bacteria from the pus.

(3) Information derived from the inoculation of animals.

(4) The attempt to formulate a line of treatment based on bacteriology.

1.—*Microscopic Examination of the Pus.*—It is better to obtain a little of the pus on a platinum loop from the deeper parts of a pocket, so as to eliminate the purely mouth organisms. A little of the pus thus obtained is smeared on a thin cover glass, and is then stained with any of the anilin stains, such as gentian

violet or carbol-fuchsin, both of which are very effective, while all the blue stains, such as methylene blue and others, are nothing like so useful with mouth bacteria as a whole. If such a preparation be now mounted and examined under a high power, it will be found that the bacteria present are both in number and variety endless, and if we look close enough we shall find that all the varieties I mentioned at the beginning of the paper may be discovered. Thus there are cocci of all descriptions, bacilli, commas, spirals, and many thread forms; in addition a few pus cells may be present, and even occasionally traces of a little blood.

Clusters of staphylococci may always be seen, but they become very much more evident in subsequent cultivation experiments.

Among the bacilli many varieties may be detected, and of them I would ask you to notice in particular the long-pointed ones known as fusiform bacilli; these organisms are quite unique among bacteria, not only for their size, which is usually large (15 u.), but also for the curious gradual tapering of their extremities.

They are often slightly curved, and may exhibit a transverse striping in their interior.

Another type of bacteria constantly present, which interests us, too, because of their form, are the spirilla; these are long, thin, wavy threads, rather difficult to stain, and more so to photograph.

This type of organism we find almost constantly present, even in healthy mouths, but whenever there occurs any oral inflammation, then their number at once become enormously increased, and this is especially true in pyorrhea, where the appearance shown in this photograph is very commonly seen, and where the whole field practically consists of these tortuous spirals. They are so fine that unless the greatest care be taken in focussing, their presence may be overlooked. It has been stated that although these spirals increase so rapidly in inflammatory conditions, on the other hand, they are the first to disappear under the influence of treatment, and almost vanish even before the disease itself does.

In a paper, elsewhere, I drew attention to the frequent coexistence of the two forms of bacteria I have been specially mentioning, namely, the bacillus fusiformis and the spirilla, and I noted also that some observers in Paris had observed these same two forms in pseudodiphtheritic affections in the throat; in their cases

the pathologic changes that occurred were ulceration, followed by suppuration in the tonsils, changes not dissimilar to those seen in cases of pyorrhea. With us the difficulties surrounding the cultivation of these organisms have prevented any further knowledge being acquired as to whether we can regard them as being in any way the cause of pyorrhea; but in the throat the problem was very much simpler, for usually these two forms were the only two present. At the present time we cannot go further than to simply emphasize the fact that there are present pretty constantly in pyorrheal pus two organisms that seem to have the power in other parts of the body of setting up changes rather similar to those that are seen around the teeth in pyorrhea.

In the pus there are present many other kinds of bacteria, but as they are neither interesting for their form, or for the information they afford, I need not refer to them now.

2.—*Cultivation Experiments.*—This portion being particularly technical, I don't propose to enter into any detail as to the methods of cultivation or the many varieties of media employed. It is unfortunate that of all the varieties of organisms that we are able to recognize in the pus, by far the great majority refuse to grow artificially, no matter what kind of media be employed. I have myself tried all the well-known media and many other special ones, but the results obtained were very meager. I was able on one occasion to get a pure growth of the spirals mentioned before, and it is interesting to note that while the culture is young the organisms are in the form chiefly of commas or vibrios, but as they grow older they resume the longer and more tortuous shape.

Another well-known organism that I was able to cultivate also, on one occasion only, was the large bacillus generally known as the bacillus maximus buccalis; this consists of very large rods with square ends, often forming chains, and just as often assuming the form of long jointless threads, the latter being the variety more commonly seen in the mouth. I mention these two forms first, because they are so admittedly difficult to grow, that Miller places them in his group of mouth bacteria that cannot be grown. Goadby first succeeded in cultivating them, and, using similar methods, I also was able to get just one sample of each.

Another bacillus that grew once was in the form of short

bacilli with rounded ends, this also tending to grow out into long chains. All these bacilli were only obtained after innumerable trials, and when they did grow it took weeks of care before they were sufficiently accustomed to artificial conditions of life for them to be further experimented with. When we turn to the cocci, however, the results are very different, for whatever media you use these organisms grow in the utmost profusion, so much so that they are a positive hindrance to the search for other types. You will recall that most forms of suppuration in the body, such as abscesses, are due to the activity of cocci; now those cocci have been very thoroughly studied and their appearance on all sorts of media is well known, and three main varieties are described, namely, the Staphylococcus Aureus, the Staphylococcus Albus and the Streptococcus Longus. Now it has been fully proved by every worker in this subject that any of this group is present in only about ten per cent of cases, and although in the other ninety per cent of cases very similar organisms were found. Yet because they did not exactly correspond, as they ought, to the usual type, therefore it was at once assumed that they were incapable of causing any suppuration. Miller and all the early investigators took this view and quite concluded that the influence of pus cocci was very slight as regards pyorrhea.

This view will, in the light of later work, not hold good, for both Goadby and myself found that many of the staphylococci, which are present in great abundance in every case, although they are not exactly like the usual type of pus-producing cocci in their manner of growth, yet are as fully capable of causing abscesses in animals as the ordinary type, and therefore their influence cannot be so easily dismissed as has been thought. This point will be referred to further under the next heading. It is sufficient here to say that some of the pus-forming cocci, either of one variety or the other, can be cultivated from every case.

The peculiar star-shaped colonies that many of the atypical group of cocci assume on culture media are rather interesting as showing what quaint shapes bacterial growths may sometimes form, and this is one among many other ways of recognizing a particular organism.

„3. *Inoculation Experiments on Animals.*—A method that was

early adopted was to inject into guinea pigs pus from a pyorrheal pocket, and this resulted in the formation of an abscess at the seat of the injection. When the pus came to be examined it was found that there were present many of the same bacteria as were present in the original pus, but that no one form or variety seemed to predominate or appear with greater frequency than the rest; little, therefore, was gained by that method. Since then every worker has injected each separate bacterium as he isolated it into an animal with, of course, varying results. I found that three varieties of bacilli I isolated, and in addition the bacillus maximus buccalis, had no effect on the animals whatever, but the spirillum invariably killed the animal, although no abscesses were formed.

When I came to inoculate the atypical cocci previously mentioned, I found that much more positive results were to be obtained; in every case where there was not already one of the common pus cocci, there was one of the atypical variety that did produce in a guinea pig a well-marked abscess. The cocci were injected into the peritoneal cavities of the animals and the abscesses were, as a rule, scattered all over the abdomen; distinct abscess formation was to be seen in the liver, spleen, kidneys and the abdominal glands.

Before passing on to say a few words about treatment, it will be well to see to what conclusions we may come as the outcome of all the experimenting that has been done. As I commenced by stating, no one has ever found one specific microbe, and few now expect to do so. The consensus of opinion is that we cannot find any microbe capable of setting up the initial inflammatory symptoms; the only suggestive fact I have come across is the association so often of the spirals and fusiform bacilli already commented on; and that depends so largely on argument by analogy to the throat that we can only look upon it as suggestive evidence. With regard to the later stages, however, we are tolerably certain that the presence of suppuration and also the various results that are the outcome of the septic condition, are directly due to the influence of the several types of staphylococci I have mentioned already.

That this conclusion is a true one is shown by the effects of the vaccination treatment to which I will shortly refer.

However much anyone may cling to the belief that pyorrhea is a general constitutional disease, there can be no doubt but that almost all the accompanying symptoms and complications, slight or otherwise, are due purely to the enormous quantity of pus-producing staphylococci, which I have described as being invariably present.

Treatment.—To the principles of treatment as commonly practiced, I need not refer at all; that resolves itself into cleanliness, astringent drugs and antiseptics, and however great the care exercised, longer experience than mine declares that the results are as a whole unsatisfactory and permanent cures the exception.

I may mention incidentally that the application of the medicinal agents to the gums by means of a compressed air spray, by which a fine spray is driven with a little force thoroughly into the deepest recesses of the pockets, will bring the active inflammation and suppuration under control more rapidly than any other way with which I am familiar.

Doubtless you have heard of the method of treating pyorrhea by vaccination introduced by Goadby, which is sometimes referred to as the opsonic method of treatment.

I have not had any experience in this line of treatment myself, but I am familiar with the details of the process, and have a good deal of belief in it, and perhaps it is just worth while explaining to you what it really means. The fact that a person is the subject of a chronic suppuration is, in itself, a proof that that person has weak powers of combating and destroying the pus-producing bacteria. Now, what do those powers consist of? Well, of course, we know that the bacteria are disposed of by becoming eaten up by the leucocytes or white-blood corpuscles.

But it has now been proved that before this can occur, the bacteria must first be prepared in some way for this eating-up process, and it has been discovered that this duty is undertaken by some rather indefinite portion of the blood serum to which the name opsonin, meaning "to prepare," has been appropriately given. Hence we see that a person suffering from disease is necessarily deficient in the opsonin relating to the particular bacteria space involved.

The whole value of this treatment depends upon the fact that

vaccination with a quantity of the necessary kind of killed bacteria has the effect of gradually increasing this opsonic power, so that the patient begins himself to overcome the disease by the stimulation of his own natural protective mechanism.

I shall weary you if I attempt to describe the method in which the opsonic power of a person is tested. It is really very ingenious, and consists essentially of mixing up a quantity of leucocytes, bacteria and blood serum and placing them in the incubator for a few minutes; a definite number of the leucocytes are then examined microscopically, the number of bacteria inside them is counted, and this number is compared to the same number of leucocytes using a normal person's blood serum; usually a larger number will be found to be inside these, and the comparison of the one with the other forms a decimal fraction called the opsonic index; thus an index of say 5 means that that person's leucocytes are only enabled to combat half as many bacteria as a normal person's.

Applying this theory, which I have but briefly sketched, to the subject of pyorrhea, we see that to those pus-forming cocci so constantly present the patients have been shown by Goadby to have a distinctly low resistance, that is to say, the opsonic index works out well below I; by vaccinating these patients, therefore, with some of their own cocci, killed by heat, he was enabled to raise the index above normal, and what is more to the point, these patients then proceded to get rid of the various side symptoms they chiefly complained of, and in addition many of the cases showed such a marked local improvement, provided that the usual local treatment was also carried out, that it seems fairly clear that these staphylococci do really exert a far-reaching influence on the course of pyorrhea, although we don't for a moment believe that they are the primary cause; and if we are able to counteract the effects of *these* organisms, then the further treatment has a far greater chance of overcoming this most obstinate condition. The opsonic method in Goadby's hands has certainly relieved many cases that nothing else would alleviate, and though we would hesitate to recommend it as a routine treatment, yet in some of the worst cases, particularly those where complicating symptoms are complained of, it would seem to have a place, and on that account I have thought it just

worth while to suggest to you the scientific means by which it has been worked out.

If it has done nothing else, this new innovation has helped to prove to us with certainty that in getting rid of the multitudes of staphylococci surrounding the teeth in pyorrhea, we are really going *far* to prevent the occurrence of the more serious aspect of oral sepsis. If we realize that from such a comparatively trivial disease septicemia and death result, then we may feel that we have done the patient a considerable service in getting rid of all these septic organisms whether we succeed in restoring the alveolar tissues completely to health or not.—*Dental Record.*

THE VALUE OF A CORRECT DIAGNOSIS OF IMPACTED LOWER THIRD MOLARS. By G. B. Winter, D.D.S., St. Louis, Mo. The abnormal positions attained by this tooth, causing a condition of impaction or failure to erupt, are at times phenomenal and cannot be correctly diagnosed by a superficial examination. The tooth at times being invisible to the naked eye, you will readily understand the great value of a positive knowledge of its anatomic relation to the surrounding tissue before operating.

As the diagnosis is half the battle in a successful operation, allow me to bring to your notice the advantage of securing a correct diagnosis, and briefly enumerate the points of interest, as shown by a radiograph of this tooth prior to extraction, so that we can give correct treatment in these cases and render competent service to our patients.

To minimize the destruction of the surrounding tissue is of prime importance, and therefore we should judiciously select a course whereby we can execute a scientific operation and disturb the contiguous structures about the third molar as little as possible. There being no two parallel cases of impaction of this tooth, we therefore cannot establish a set rule for its extraction. Our method of procedure should be to secure an absolute knowledge of the position of the tooth. To conjecture at the position or to surmise where the obstruction may be is a hard problem to solve; consequently this practice is not to be countenanced, as the re-

sults are necessarily unsatisfactory, and tax the endurance of the patient and operator.

A few years ago it was my fortune to witness an operation for the removal of an impacted lower third molar. The operator made an examination and found a small portion of the crown visible through the highly inflamed gum tissue. Telling the patient that he would "take a chance at it," he incised to expose the parts as far as possible; he then inserted his forceps and took hold of whatever he could, and then started on a merry tug of war with the tooth. He soon discovered that his opponent was stronger than he had anticipated; after an interim, he tried for an hour or more, and finally dismissed the patient, with instructions to return the next day for another battle and a "trust to providence" for results. This impacted tooth was held fast at some point which was not visible, its anatomic position was such that in order to overcome the difficulty the operator would have to have a correct knowledge of the surrounding structure and the contact point which was to be overcome.

Sacrificing the second molar in order to relieve the pathologic condition caused by an impacted third is a practice that should be condemned; it may be a simpler method of procedure, but the destruction of a second molar for a malposed third is not good practice.

Before proceeding to the subject of diagnosis, let us briefly consider the causes of impaction of this tooth. Being the last tooth to assume its position in the arch, erupting usually between the ages of seventeen and forty, it often becomes a very troublesome member, and is found impacted more than any of the other teeth; it is situated at the extreme ends of the arch; access to it is very difficult, especially when the parts surrounding it become inflamed, which causes a tension upon the tissue and muscles associated with it; the most frequent cause of impaction can be attributed to the crown of the second molar, as the tooth erupts in every imaginable position, and should its crown or any part of it tend to direct below the crown of the second molar, it will be stopped from making further progress and be maintained in this position until extracted or the obstruction be overcome. Heavy, fibrous gum tissue is another factor that causes quite a bit of disturbance, especially if

the tooth is partially erupted; lack of space beween the second molar and the ramus of the jaw invariably retains the tooth; unusual development of process is another disturbing element, but is more readily overcome than the first-mentioned cause; supernumerary teeth, although not found so frequently, will bring about this condition; recently the essayist removed eight of them, which were responsible for the retention of the tooth.

The impaction of this tooth from aforesaid causes will invariably bring about a pathologic condition which will interfere with articulation and deglutition, causing discomfort, also involving the tonsils and often extending beyond them. The utmost care should be exercised in the extraction of this tooth, giving proper consideration to the causation, the condition of the adjacent structure and the patient, and lastly a correct description of the position.

To classify the impaction of this tooth for purpose of diagnosis, we will divide it into a partial and complete impaction. The former or partial impaction can be readily diagnosed with a suitable exploring instrument. In operating upon a partial impaction, we must take into consideration the size of the crown, its direction in relation to its normal position and to the adjacent molar, the amount of tissue involved, the process to overcome, the space through which the tooth is to pass; also, an examination of the molar on the opposite side is imperative, and a knowledge of the presence of any foreign body.

A complete impaction indicates a tooth that is invisible to examination, and to the radiograph we must resort for diagnosis; this will give us beyond all doubt the correct relation of the impacted tooth to the second molar, the points of contact, the shape and size of the crown, the length of the roots and any abnormality connected with them, the space through which the tooth is to pass, and any foreign body which may be present.

The method of securing these radiographs has been published repeatedly and good results have been obtained along this line by Drs. Kells, Shamberg and Price. It is very difficult to secure good radiographs of the third molar, the parts not being as accessible as the anterior teeth. For this work it is essential that the radiographs should be taken by an expert who will understand what we dentists need in this direction. When we have secured the

radiograph, we must take into consideration the history of the case, the condition of the soft tissue and such other conditions as are not made apparent by the radiograph, as this only outlines the hard tissues.—*Western Dental Journal.*

THE INLAY IN ITS RELATION TO LIVING PULPS AND PULPLESS TEETH. By Dr. A. W. Harlan, New York. Operative dentistry is being so gradually and certainly revolutionized in consequence of the wide use of the inlay—gold or porcelain—that we are compelled to concern ourselves about the effect of this radical departure from the old-time filling. There is, however, one great drawback to the use of inlays, which consists in the fact that they must be almost, if not wholly, retained in teeth by a film of cement. Many inlays can be held in the teeth by their bulk and the mechanically retentive shape of the cavity when cemented. Unless this is done carefully and accurately, disaster is sure to come through the loosening of the inlay or fracture of a portion of the tooth. The process of filling with inlays has brought about a change in cavity preparation which to my mind is a decided advantage over the grooving, dovetailing, and pit anchorages so frequently required in the filling of teeth with cohesive gold.

At the outset, I am an advocate of the inlay process of filling teeth. It is far more adaptable for a greater number of cases, for permanent filling, than cement alone or alloy fillings made into amalgam with mercury. It is true that millions of teeth will be filled with plastics for years to come, but the porcelain inlay, when done skilfully and carefully, is the ideal filling for anterior teeth exposed to view; while the gold inlay will take the place of the hardly-wrought restoration by mallet and the use of the rubber dam. There are certain small cavities on the buccal surfaces of teeth and in other situations which should be filled with gold, but these as a whole are in the minority. In the incisal restorations with porcelain the minutest care should be exercised so as not to encroach upon or cut too near the pulp, as it is much better to make a larger surface area of the inlay lingually than to run the risk of nearly exposing a pulp. I am not describing the details of cavity preparations, which are well

known to most of you, but I am making a special plea not to cause the death of a pulp a few months after the inlay is placed within the tooth. It is far better to remove the pulp entirely before making the inlay, when in doubt, than to leave it to die and cause needless destruction of tooth-substance and probably a discolored and unsightly crown. I have seen many cases where the pulp had died and left a discolored crown, with an inlay four or five shades lighter than the remainder of the incisor or other exposed oral tooth. The most approved method of filling loose teeth is by the inlay or a plastic, thus saving shock, irritation of the pericementum, and fatigue to the patient and operator. The inlay, whether baked, cast, or made with a blowpipe, is a fixed procedure to arrest caries. The cavity must be shaped so well mechanically that the inlay will fit when finished, plus the film of cement interposed between it and the tooth walls.

In order not to have too much bulk of gold, or even porcelain, in making an inlay, the whole cavity may be filled with cement, and in a day or two a smaller restoration will be possible, by making suitable steps or fluting the interior of the cavity for retention. This is especially valuable for frail teeth and those where the pulp might be subject to shock if a gold inlay came too near it.

When a porcelain inlay is made, the color is of the first importance in all teeth exposed to general view. Porcelain should be so manipulated that its texture is firm and uniform. Friable edges are to be avoided, and when the filling is to be cemented, absolute dryness should be secured at all hazards, in order to secure the union of inlay and tooth with the cement. This is a matter which can be practiced with great success when the inlay is heated to 105° F. before setting it in the cavity. Many failures of union of inlay and cement occur because the temperature of the tooth-cavity and that of the inlay is not the same. A variation of twenty-five to thirty degrees is the difference between the inlay and the tooth, and if this be reduced to three or five degrees the results are nearly perfect. In wood inlays it is the medium that is heated, not the separate pieces of wood, uniformity being gained by the union of the two pieces. If you will place a glass or porcelain slab in water at 150° F. a few moments

before setting an inlay, and put the porcelain or gold inlay on the heated glass long enough to bring its temperature up to 100° or 103°, and then place it in the tooth, you are certain to have better and more uniform results than you now obtain by not heating the inlay. In all of the processes of mosaic work with glass, jewels, or stones, the cementing medium and the hard substances are of the same temperature. Wood is inlaid with hot glue, varnish, or gum, and inlaid metals are hammered or driven into grooves for the softer metal to constitute the inlay. Damascene, Buhl, and Cloissonné are styles of the inlay which we cannot use in filling teeth, but we can insert inlays into teeth more certainly and permanently with approximately uniform temperature than with a variation of twenty to thirty degrees, as we have been doing.

The Abutment Inlay.—The inlay abutment for bridges I am not prepared to pass an opinion upon, as I have seen many failures so far, and it is my belief that only a few cases of this kind are suitable for inlays. My choice would be to envelop the whole crown, on account of the changes which take place in the position of the teeth from disease, changes of occlusion, and the increasing age of the patient. The fracture of the teeth from the stress of mastication and the liability of abutments becoming loose render the universal use of inlay abutments impracticable. As soon as these one-third and half crown inlays loosen—which they are liable to do—caries progresses much more rapidly than when the root is surrounded by a shallow band, or even when it is only covered by a bandless crown. The thermal changes are to be taken into account in abutment inlays when the pulp is alive. Many of these abutment anchorages are unsanitary and caries results in close proximity to them.

It is not a safe practice for general use, as forever, or even twenty years, is a long period when teeth are considered. The introduction of the inlay into operative dentistry will be a blessing in disguise to mankind, as it will bring about uniformity in the treatment and filling of roots. Suppose we place a large inlay in a molar tooth so that easy access to the canals is not possible and later we are compelled to remove the inlay in consequence of the development of an abscess. Then we will not pin our

faith to some "dope" sold as a sure cure for root troubles, putrescence, or embalming the remains of pulps in teeth. Nothing will compensate for lack of cleanliness of root-canals and complete disinfection, and, at least, thoroughness in filling roots. If this is performed well and carefully it is a safe procedure to introduce gold and porcelain inlays of large size, but if reliance is placed upon any method of using cotton or strings of silk or destructible disinfectants to prevent the development of an abscess, the certain loss of the crown of the tooth will follow. It is not an easy matter to dislodge a large gold or porcelain inlay from a pulpless tooth anywhere in the mouth, to say nothing of a large molar restoration. It has happened to be my misfortune to attempt cutting through some of the artificial enamel fillings, after a pulp had died, causing much misery to the patient and much labor for myself. If these fillings are inserted in close proximity to the living pulp not protected by cement, the pulp is almost certain to die, and when they are placed in pulpless teeth the greatest care is necessary to have the roots thoroughly disinfected and filled before the filling is inserted.

There is no general practice or system of removing pulps of teeth in vogue today, nor is there any attempt made to adopt a positive system of root-filling. It is a misfortune that our best men are so easily satisfied with such trivial attempts to disinfect with useless combinations of drugs, and are also satisfied to fill roots with any one of a dozen different materials, trusting to luck and a good condition of the patient to prevent abscesses and many times the loss of one or more teeth. I think it is safe to say that 50 per cent of treated teeth lost before fifty years of age are lost through bad treatment in cavity preparation before the pulp is dead, the remainder being due to faulty methods of root-disinfection and root-filling. I do not attribute the loss of all teeth to this, for many teeth are lost without treatment, from ignorance, from malposition, and a variety of causes, such as loosening, and failure to have fillings made at an early age. Many teeth are lost from the unwillingness of the patient to endure the pain of removal of the fillings after the death of the pulp, or after attempts have been made to treat and fill roots. It is deplorable to see so many bridges in the mouths of

the young as are seen daily, most of them due to imperfect handling of cavities in teeth with living pulps, and the remainder from imperfectly filled roots. This is an age of rush and bustle and hurry, and we must shoulder the responsibility of attempting to check it to keep pace with other professions in preparing our students to be thoroughly trained in practical as well as theoretical knowledge.

In the foregoing remarks perhaps it is only natural that you should ask, What remedy do you propose to correct the evils of practice? I am not a Moses, do not aspire to the position of leader, have not the least wish to force my own views upon you, still I am compelled to protest against the acceptance of the theoretically finished porcelain inlays and abutment inlays, latterly and at present passing through our journals, as practical. Many of these productions are not based upon clinical experience of sufficient length of time to be considered as permanent additions to regular practice. It is easy for an old-timer to read between the lines in papers, and I would consider it a grave misdemeanor if I did not protest against the highly imaginative style of picturing porcelain restorations which we have read so much about during the past two or three years. In order to serve our patients well, we must be optimistic as to the future permanence of our work and conservative in performing it and placing it in position.

On the subject of disinfection and root-filling my views are well known. First, the root must be made surgically clean and free from pulp débris. Second, all poisons must be diluted, washed out, or rendered inert. The roots should be dried and then filled mechanically with some form of guttapercha which will adhere to the walls of the roots. No half measures will avail—root fillings to be permanent must be endowed with indestructibility at the outset. The incorporation of iodin, salol, thymol or other drugs soluble in water in a root-filling is not based upon anything but theory. If the roots of teeth are filled with gold, soaked in creosote, unless the apices are filled with the gold, sooner or later an abscess will be the result. It is wiser to spend much time on the substructure—the root—than to gloss it over and have failure come later. It is a failure when per-

sistent pericementitis or an abscess follows the filling of a root. The study of root forms and cuttings of roots shows that it is not possible to fill a majority of such roots with wire or gold foil, or even lead or tin. I would not dare place a large gold inlay in a molar tooth with the roots filled by any of the above metals. To do so would be to court disaster. It is far better to perform such operations with a plastic like guttapercha, even though a minute portion passed through the apex, as it would be encysted. When the roots of the teeth are filled they must be dried and oiled with eucalyptol or cajuput to facilitate the adhesion of the dissolved guttapercha, which is pumped into the root with small broaches, after which cones may be used cold. These are kept in a glass-stoppered bottle or protected from the air with sterile cotton. The cones are always disinfected, first in alcohol and then in a 10 per cent solution of monochloracetic acid in water, or in a formalin solution, when they are ready for use after being dried. I am not an enthusiast in reference to embalming dead pulps in a living person.—*Dental Cosmos.*

CERTAIN PHASES OF OUR PROFESSIONAL DUTY. By C. N. Johnson, M.A., L.D.S., D.D.S., Chicago, Ill. At the fiftieth anniversary of the Northern Ohio Dental Society, which was held at Cleveland in June, 1907, I read a paper on "Some of the Advances in Dentistry in the Past Fifty Years." Among other advances I mentioned the subject of orthodontia, and in the discussion of the paper Dr. H. A. Smith, of Cincinnati, than whom there is no more conscientious or lovable man in the dental profession, departed a little from the subject matter of the paper to say that in the practice of orthodontia a distinction in methods might be desirable whereby in the case of a child of poor parents extraction of certain teeth could be resorted to, thus simplifying the operation of regulating and saving expense, while if the child was rich the arches could be expanded and the case managed along the lines of the most approved and modern ideas of orthodontia. In justification of this procedure he cited the late Dr. Atkinson's remark that some peopie may wear silk while others must content themselves with calico, leaving the inference that this distinction between the rich and the poor applied to dental operations the same as to dress goods.

I could not find myself in sympathy with such a sentiment, and besides I feared that Dr. Smith's personal attitude would be misunderstood, so in closing the discussion I took occasion to deplore the fact that Dr. Atkinson had ever used such an expression in connection with professional service, and also to say that I considered it a serious matter to extract a tooth for a child, whether rich or poor, merely as a matter of expediency.

It seems that I said this with an unwarranted degree of fervor, which called down on my defenseless head a very bright and witty paper by my good friend Dr. C. M. Wright of Cincinnati, at the December, 1907, meeting of the Ohio State Dental Society. Dr. Wright takes the ground that while it is a very beautiful theory to treat the rich and poor alike in professional service, and while it makes an inspiring theme for the enthusiastic orator to spread his wings upon, yet in actual practice a sensible man will use due discrimination and try to make the character of his service conform in a reasonable measure to the purse of his patient.

Well, let us see. Since this question has been raised it may be well to enter into a somewhat careful consideration of what a practitioner's real duty is in the attitude he assumes to his patients, both rich and poor, on this important matter. Let me state in the beginning that I am not advocating indiscriminate charity in dental service for any class of people. More than this, I am not a believer in much of the so-called charity that is administered today. I believe it is doing more harm than good by fostering pauperism, and creating incompetents in our midst. But I cannot detach myself from the idea that there is something different in the relationship which should exist between the professional man and his patient and that which exists between the shop-keeper and his customer, and I still deplore the use of the terms "silk and calico" as illustrating distinctions in the character of professional service.

Is it right to extract the tooth of a poor boy just because he is poor? Remember I am not speaking of any other operation except extraction. From a somewhat close clinical study of the conditions in very many mouths, I have grown to be quite strongly opposed to the thoughtless extraction of any permanent tooth. I see so much havoc written in the dental arches by the disarrangement of occlusion and articulation often from the ex-

traction of a single tooth that I cannot think lightly of this operation. In fact in the attempt to regulate teeth where financial considerations have not entered into the matter at all it has frequently happened that the extraction of teeth with the best of intentions has resulted most disastrously. I know that this is true because it has occurred in my own practice where I have unwisely thought to relieve the pressure on the arches by the extraction of a tooth, and have left a condition worse than the first without any relief of pressure.

A mistake of this kind is a really serious matter and a conscientious man who makes it once will never again extract a tooth without due deliberation whether the patient be rich or poor. This is entirely a different procedure from inserting a filling material which is not expensive through motives of economy to the patient. I am not Quixotic enough to claim that dentists should unswervingly do the most expensive work for patients who cannot afford to pay for it. But I do think even then that dentists should strive to save the teeth of all those patients who are really anxious to have them saved—if need be with the less expensive materials. A tooth filled temporarily has the option later of being filled permanently, but a tooth once extracted is irretrievably lost. This makes a very clear distinction between the practice of filling teeth with inexpensive materials and that of extracting permanent teeth as a supposedly short-cut to their regulation.

What, then, shall be our attitude toward a child with irregular teeth and with poor parents? No one realizes the difficulty of this situation more than I, nor do I believe any set rule of conduct can be formulated. It must be decided in each individual case according to the conditions and the conscience of the practitioner. I can hardly have the courage or the conviction to ask of the profession to do for these children what I did for many years when I was accepting cases of orthodontia. I never yet turned away a patient from my office on account of fees where there was an earnest desire on the parents' part to have the teeth regulated, and I have in several instances carried through quite extensive cases of regulating without any fee at all. This I now believe to have been wrong—both in principle and in practice. It is demoralizing to any individual to accept something for nothing, and the man who fosters such a thing is guilty of an injustice to

society. There are few parents today so very poor that they cannot pay something for such service, and the work will be more appreciated if it involves some expense. A perfectly frank understanding should accordingly be had with the parent to the effect that there must be a mutual sacrifice, and I am convinced that in the end every conscientious practitioner will be better pleased with himself if he carries through a case of that kind on the most approved principles, even though his fee is not large.

The great trouble with this entire question of compensation is that too many professional men fail to develop early in their career that perfect understanding and complete confidence between practitioner and patient which is really the keystone in the arch of professional harmony and good-will. When a patient knows that a dentist is honest and capable, and has in his makeup that essential element to all perfect success—the milk of human kindness—there is little difficulty concerning the regulation of fees, provided the patient really wishes the dentist's services.

I do not expect the millennium very soon, but I do hope for the dental profession that kind of advancement along the line of equity and justice which shall impel them in their treatment of patients to invariably apply the golden rule. This seems so simple a thing to suggest, and yet it is apparently so difficult to have put into practice. In its ultimate application it is always a personal matter, and each man should settle it on the basis of his highest understanding and his most exalted charity. Not that he shall slave himself to death doing hard and exacting work for a mere pittance. It is not necessary. There are always exceptions, but the great mass of the people will gladly pay for dental service when they are properly educated to its value. Please do not tell me that the people of this fair land are, as a class, too poor to pay for having their teeth attended to. We are surely not such a poverty-stricken nation as that. It is simply a matter of educating them as to the value of dental service, and, be it said, the surest way of doing this is to so perform the operations we do that they demonstrate their value by their permanence. When a man points to a molar which fifteen or twenty years before had begun to give him trouble, but which, after a couple of visits to the dentist, has remained comfortable and serviceable ever since, he is a pretty good evangelist for dentistry, and there

is usually little trouble in convincing him that his children's teeth should have careful attention and that the service should be adequately paid for. There is more dentistry being done today than ever before and for higher remuneration. Why? Chiefly because better dentistry is being done.

I grow so enthusiastic when I think of the present development of the profession that I would, for the moment, if I could, close my eyes to some of the discouraging features which still have a tendency to hold us in bondage. I would fain forget the four-dollar crown, placed on a tooth that has no need of a crown, of the cotton left in root canals as an easy way of filling them, or large masses of decalcified dentin utilized as the treacherous foundation of an amalgam or even of a gold filling.

But I am getting somewhat afield from the specific subject of my paper, which is to instil into the minds and hearts of the members of the profession the principle that in the practice of dentistry we are assuming a different obligation to the people we serve than if we were selling those same people silk and calico. A poor boy may be clothed in cheap raiment and be none the worse, provided it keeps out the cold in winter, but if a permanent tooth is extracted from this same boy it may cripple his masticating apparatus for life. And please remember this one thing, that the social and financial status of people are continually changing, and the poor boy of today often becomes the rich man of a few years hence. This is particularly true in our own country, where the opportunities for advancement are unlimited. When the man has ascended in the social scale and assumed the privileges and prerogatives of wealth and culture he may well laugh, and usually does, at the memory of the homespun apparel of his boyhood days, but if his teeth have been ruthlessly slaughtered through motives of expediency he never sits down at his well-laden table without a pang of regret at the needless sacrifice which handicaps his enjoyment of every meal. And there are numberless men in this very position today.

Shall we, as a profession, ignore this fact and allow the influence of a few dollars to dominate our method of practice in these cases? I am, of course, not speaking of the very many instances where teeth are lost without any appeal to the dentist, where they are neglected through ignorance till they are hopeless and where

the inevitable has already occurred. These cases are happily growing fewer in number, but they will always exist to a degree, and we cannot be entirely held accountable for them.

But we need a rule of conduct for these cases which do come under our observation, and this rule should be dictated by the highest sense of professional honor and an earnest devotion to the best interests of the patient. May I venture before this body of earnest workers to formulate such a rule—one which of necessity must be general in its provisions and yet applicable to every case which is presented? I would respectfully submit the following: No professional man shall allow financial considerations to influence him to do an operation which may work a permanent or irreparable injury to the patient.

This rule carried out to the letter, and backed up by the spirit of loving kindness, which should permeate all professional effort, will develop a delightful sentiment between practitioner and patient, and I am yet to be convinced that it will in the end leave the practitioner any poorer either in spirit or in purse.—*Dental Review.*

MERCURIAL STOMATITIS. By Dr. Morestin, Paris, France. A man aged twenty-five, of weak constitution, having contracted syphilis, was given a mercurial treatment in the form of hypodermic injections of gray oil. Six such injections were administered, when a severe attack of stomatitis ensued, accompanied by intense mandibular trismus. The mouth condition was treated by means of irrigations with hydrogen dioxid, but these were of little avail in arresting the infectious inflammatory process. A few months after the mercurial treatment was begun deep ulcers made their appearance upon the mucous membrane of the cheeks and on the anterior pillars of the fauces; the breath was decidedly offensive, salivation very abundant, and his general condition far below par. Additional treatment of the ulcers with hydrogen dioxid and applications of tincture of iodin improved the condition of the mouth, but still the patient's general condition grew steadily worse. The loss of weight continued, he was very pale, diarrhea and fever set in, and the cheeks and temporal and submaxillary regions became edematous. Shortly after the appearance of the latter symptoms the patient expired.

The following is the report of the post-mortem examination of the case: Kidneys and liver were the seat of fatty degenerations, especially the kidneys, which were large and white. Stomach and intestines, brain and meninges normal. Pharynx normal except the anterior pillars. On the left side there was extensive and deep ulceration of the cheek, which was almost perforated, and necrosis of the ascending ramus and angle of the mandible and degeneration of the muscles of mastication.

The temporomaxillary and temporal fossæ were filled with pus. The posterior portion of the maxilla was denuded and necrosed, as well as the pterygoid process. The palatal mucous membrane was detached and the space between the latter and the hard palate was filled with purulent matter. Similarly the gum was detached and separated by pus from the alveolar border. The molars were in their respective alveoli, but devitalized and extremely loose. The left maxillary sinus was filled with pus. On the right side there was extensive purulent sinusitis, necrosis of the maxilla, and ulceration of the cheek, but no changes in the mandible or suppuration of the temporal and temporosphenoidal fossæ. The tongue presented no abnormal appearance.

From the study of this case the author shows the following conclusions:

(1) Treatment with gray oil is excellent and devoid of danger, provided the patient is properly cared for in view of preventing mercurial stomatitis. In Paris hospitals in which this treatment is followed the patients are kept under scrupulous surveillance, and if stomatitis appears it is generally of a benign type.

(2) In the case under consideration the gray oil was indirectly responsible for the onset of the inflammatory phenomena in the mouth, but did not itself cause the death of the individual, this having been brought about by the intensity of the buccal suppurations.

(3) The morbid phenomena occur in the following order: Stomatitis, ulcerations of the cheek, periostitis of the mandible, subperiosteal abscess, necrosis, periostitis of the upper jaw, necrosis, sinusitis, deep phlegmon of the face, involvement of the oropharynx. These lesions cannot be directly imputed to mercury; they are secondary to the buccal infection—to the ulceration of the cheeks. Diffuse osteitis of the jaws is always a very grave affection, which

by itself may be the cause of a fatal termination. Resorption of bone from around the pyogenic foci takes place and in addition pus is continually swallowed with the saliva. Chassaignac has studied the disturbances resulting from the ingestion of pus and absorption of inflammatory products in the case of fractures of the jaw, and has designated them under the generic term of purulent buccal cachexia.

(4) In the case of the patient under discussion it is probable that the severe symptoms would have been prevented had he not remained for a long time without medical attention. In addition, it should be noted that in this instance the osteitis, necrosis, and perimaxillary suppurations developed without causing any external manifestations such as redness, edema, high fever, or pain, and that a thorough examination of the mouth was rendered impossible by the severe degree of trismus evident almost from the beginning of the trouble. Otherwise one or more surgical interventions at the proper time would have averted the onset of the symptoms responsible for the tragic termination of the case.—*Dental Cosmos.*

DENATURED ALCOHOL FOR ANNEALING GOLD; A SUGGESTION TO THE DENTAL SURGEON. Those dentists who practice in cities may use the Bunsen flame for annealing gold foil, or they may use electrically produced heat for this purpose; but many city practitioners prefer the alcohol flame and all country practitioners are obliged to use it.

Therefore the prohibition of the sale of alcohol, except upon a physician's prescription, will inconvenience dental surgeons in all states or localities where prohibition is in force; and our lawmakers are open to criticism for overlooking the interests of the dental profession in the framing of prohibition measures.

Since January 1, 1908, in Georgia, for instance, doctors of dental surgery have not been able to procure alcohol for their lamps or other purposes upon their own prescriptions; and they have been obliged to send out of the state to get alcohol with which to generate the heat necessary for annealing gold for filling operations, unless we can discover a satisfactory substitute for ethyl alcohol for this purpose.

What are the requirements of a satisfactory substitute? (1) It

must be capable of producing uniform and intense heat during combustion; and (2) it must not liberate products of combustion which will impair the cohesiveness of the gold.

The heat producing power of wood alcohol (methyl alcohol) is sufficient to anneal gold and is only about 10 per cent less than that of ethyl alcohol. But what about the products of combustion of wood alcohol? Is the wood alcohol flame likely to deposit matter on the gold which will destroy the cohesive property?

The products of combustion of wood alcohol are the same as the products of combustion of ethyl alcohol, except that the wood alcohol products are less. We may represent the rapid oxidation or burning of wood alcohol by the following equation: $CH_3OH+O_2=2H_2O+CO_2$. And we may represent the combustion of ethyl alcohol thus: $C_2H_5OH+3O_2=3H_2O+2CO_2$. It will be observed that the oxidation of the grain alcohol per molecule produces three times as much water and twice as much carbon dioxid as does the oxidation of the wood alcohol; yet the wood alcohol molecule is considerably over half as heavy as the ethyl alcohol molecule. So we must conclude that the wood alcohol is preferable to grain alcohol for the purpose under discussion, in so far as the deposition of moisture on the gold is concerned, though this difference is probably immaterial because the moisture is at once dissipated by the intense heat of the flame.

In view of the foregoing facts it is reasonable to believe that a mixture of wood alcohol and grain alcohol would be a better source of heat for annealing gold than either of these alcohols used separately. So it occurred to me that denatured alcohol, which is ethyl alcohol poisoned by the government with 9 per cent of wood alcohol and 1 per cent of benzine (to render it unfit to drink), would be a satisfactory substitute for ordinary grain alcohol for annealing gold. Therefore I recently instituted a series of practical tests of the matter by experienced dentists. The results were highly satisfactory, and demonstrated that denatured alcohol is fully as reliable as ethyl alcohol alone for tempering gold foil.

The wholesale cost of denatured alcohol is only about twenty-five cents per gallon; so that a seeming hardship on the dentist involved in prohibition laws turns out to be a blessing in disguise.—*Medical Consensus* (*American Dental Journal*).

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Where All Communications Should be Addressed.

Editorial.

OUR LITERATURE.

It is said that the best way to judge a nation is by its literature. This is likewise true of a profession. If the public were to judge the dental profession by its literature, what would be the verdict? We believe that it would compare favorably with other professions. For the last few years we have devoted considerable time to the reading of our dental literature as it appears in the journals from month to month; and it is with a great deal of satisfaction that a gradual but healthful improvement is noted. It is true, we need more text-books, but it takes time to prepare these; and it is gratifying to know that, during the past year, several most excellent text-books have been published.

There are many elevating influences which have been fruitful in the advancement of dentistry. Among these might be mentioned dental colleges, dental societies, state dental examining boards, and, by no means least, dental journals.

A careful review of our literature will reveal the fact that there is a growing tendency on the part of the profession to delve more deeply into the hidden mysteries of oral pathology. This is evidenced by the number of articles on pathologic subjects. The work that is being done to-day along the line of oral pathology cannot but have a broadening influence.

From our literature, also, we learn of the great activity, on the part of the profession, in disseminating dental knowledge to the public. It is evident that if the public are to be educated as to the care of the mouth and teeth, as they should be, the education

must come from dentists. This is one duty that must be recognized, for it cannot be successfully delegated to anyone else. It would seem that this fact is quite well understood for many valuable articles have recently appeared on the education of the public in dental subjects. It will be necessary, however, to go farther than this and include in our literature a pamphlet or book written in plain and simple language, to which the public has free access. The benefit to humanity resulting from such a propaganda by the profession cannot be overestimated.

Dentists in the past have ever been accused of being poor business men. There have appeared in the journals during the past year several timely articles on the business side of dentistry, which, if read and studied, will furnish the busy dentist with many valuable suggestions.

If we were prone to criticise our literature, though not in a critical mood, we would call attention to the need of a more definite nomenclature. To one who reads all of the dental journals it is surprising to observe the variety of names used by dental writers and passed by dental editors. It may be that the profession will never agree on one name for the disease which causes a progressive loosening of the teeth. If more time were spent in searching for the real cause or causes of the disorder and less time in trying to find a name characteristic of the many symptoms, more good would result to suffering humanity. But however difficult it may be for the profession to unite on a name for this condition, it does seem ambiguous, and a needless use of the English language, to call the membrane which surrounds the root of a tooth by so many different names as appear in our literature.

There are many other examples that could be cited to show the need for a more definite nomenclature. It is true that the committee on nomenclature from the Institute of Dental Pedagogics have simplified matters a great deal; but this cloud on our literature could be cleared more readily if all dental editors would adopt and use a universal nomenclature. Let us hope that this result will soon be accomplished. We call attention to this phase of our literature, not critically, as has been mentioned, but to the end that advantage may be taken of every opportunity by all who are interested in making our literature reflect the true standing of the profession.

J. P. B.

Correspondence

Editor DENTAL DIGEST, Chicago, Ill.

Dear Sir:—In your May issue of the DENTAL DIGEST I have read with interest the article on "Plastic Fillings," by H. B. Tileston, D.D.S., and during its perusal I noticed at the bottom of page 542, in finer print, a further explanation of what metaphosphoric acid really is. I desire to call your attention to an error in the chemical formula (probably typographical), it being in print as H_3PO_3. This, as you know, is *phosphorus acid* and not metaphosphoric acid. There are several acids of phosphorus, but the three of interest to the dental profession are the meta, ortho and pyro phosphorics. They are derived from phosphorus pentoxid, P_2O_5, by adding one, two or three molecules of H_2O to it, respectively, as follows:

$$P_2O_5 \begin{cases} + H_2O = 2HPO_3 \text{ Meta.} \\ + 2H_2O = H_4P_2O_7 \text{ Pyro.} \\ + 3H_2O = 2H_3PO_4 \text{ Ortho.} \end{cases}$$

This same classification also holds true with the arsenic and antimony oxids, As_2O_3 and Sb_2O_3.

Sincerely yours,

GEO. E. BOLLES.

DANBURY, CONN., June 2, 1908.

The formula for metaphosphoric acid, as stated above, is HPO_3 and not H_3PO_3.—Editor, DENTAL DIGEST.

Bibliography

HUMAN PEARLS.—A neat little book entitled "Human Pearls," by Francis Eaton Burnett, D.D.S., has recently made its appearance. This little book contains much valuable material, written in simple language, and should prove to be a great aid in the dissemination of dental knowledge among the laity.

LECTURES ON GENERAL ANESTHETICS IN DENTISTRY.—Dr. William H. De Ford of Des Moines, Ia., has prepared a book in the form of lectures on general anesthetics in dentistry, advocating painless dental operations by the use of nitrous oxid, nitrous oxid and oxygen, chloroform analgesia, ethyl chlorid and somnoform. In this book will be found many practical suggestions on the use of these various agents. Dr. DeFord's long experience qualifies him to speak with authority on the subject of anesthetics.

Obituary.

J. W. McLEAN, 48 years old, a dentist of Waitsburg, Wash., died May 10, 1908.

HORACE S. BASCOM, 63 years old, one of the oldest dentists in New Haven, Conn., died May 11, 1908.

W. F. STANSBURY, a prominent dentist of Lexington, Tenn., died from heart failure May 23, 1908.

HIRAM L. WOODBURN, 62 years old, a retired dentist of San Francisco, died suddenly May 18, 1908.

FRANK R. DICKERMAN, one of the best known of the younger dentists of Taunton, Mass., died May 11, 1908.

ELLWOOD E. HOPKINS, 68 years old, a well-known dentist of Philadelphia, died after a short illness May 12, 1908.

JOHN J. O'CONNELL, 36 years old, a successful dentist of Danville, Ill., and a famous baseball player, died May 14, 1908.

JOHN DAVIS, a dentist of Columbus, O., died May 31, 1908.

FRANK H. LAMBERT, 35 years old, a dentist of Lubec, Me., was drowned May 13, 1908.

T. M. LEONARD, a dentist of Greenville, S. C., was drowned May 25, 1908.

S. J. McLAUGHLIN, 76 years old, one of the oldest dentists in the vicinity of Pittsburg, died at Knoxville, Pa., May 30, 1908.

IN MEMORIAM.

DR. H. NEWTON YOUNG.

In respect to the memory of Dr. H. Newton Young, the Susquehanna Dental Association of Pennsylvania at their annual meeting, May 21, 1908, adopted the following resolutions:

WHEREAS, Death has removed from us our esteemed friend and coworker, Dr. H. Newton Young; and

WHEREAS, In his decease we have suffered the loss of a member who had an active and earnest interest in this association, and who had the welfare of the entire profession at heart; therefore, be it

Resolved, That we, the members of the Susquehanna Dental Association, in annual session in Williamsport this 21st day of May, 1908, while of necessity yielding to the inevitable, deeply deplore his death, and earnestly unite with the bereaved family in mourning his untimely loss, and assure them of our admiration for his high personal and professional qualities; and be it further

Resolved, That these resolutions be spread upon the records of this asso-

ciation, a copy sent to the bereaved family, and copies sent to the dental journals for publication.

C. S. VAN HORN,
JOHN C. HERTZ,
C. C. WALKER,
Committee.

Notices.

NEW MEXICO DENTAL ASSOCIATION.

The New Mexico Dental Association was organized in Albuquerque, May 28, 1908, and officers for the ensuing year were elected as follows: President, Frank N. Brown, Roswell; 1st Vice-President, E. J. Alger, Albuquerque; 2d Vice-President, A. J. Casner, Santa Fe; Secretary-Treasurer, L. E. Ervin, Carlsbad.

NEW HAMPSHIRE DENTAL SOCIETY.

The thiry-first annual convention of the New Hampshire Dental Society was held in Keene, May 12, 13 and 14, 1908, and officers for the ensuing year were elected as follows: President, Z. P. Shaw, Claremont; Vice-President, H. P. Baldwin, Manchester; Secretary, F. F. Fisher, Manchester; Treasurer, A. W. Young, Concord.

NORTHERN OHIO DENTAL ASSOCIATION.

The fifty-first annual meeting of the Northern Ohio Dental Association was held in Canton, May 26, 27 and 28, 1908, and officers for the ensuing year were elected as follows: President, D. H. Zeigler, Cleveland; Vice-President, W. A. Siddall, Cleveland; Recording Secretary, L. S. Vinez, Louisville; Treasurer, S. D. Dewey, Cleveland.

NORTH DAKOTA DENTAL ASSOCIATION.

The third annual meeting of the North Dakota Dental Association was held in Devils Lake, May 12 and 13, 1908, and officers for the ensuing year were elected as follows: President, T. G. Thompson, Cavalier; Vice-President, W. J. Brownlee, Devils Lake; Secretary, F. A. Bricker, Fargo; Treasurer, Samuel Rowan, Hillsboro. The next meeting will be held in Cavalier.

FLORIDA STATE DENTAL ASSOCIATION.

The twenty-fifth annual meeting of the Florida State Dental Association was held in Tampa, May 21, 22 and 23, 1908, and officers for the ensuing year were elected as follows: President, C. L. Nance, Tampa; 1st Vice-President, L. F. Blalock, Ocala; 2d Vice-President, R. L. Anderson, Plant City; Corresponding Secretary, Dozier Leitner, Tampa; Recording Secre-

tary, C. H. Frink, Fernandina; Treasurer, D. G. Barnett, Arcadia. Executive Committee, L. Colson, W. A. Dean, A. B. Whitman, D. B. Crews, H. L. Jarvis. The next meeting will be held in Ocala.

SUSQUEHANNA DENTAL ASSOCIATION.

The forty-fifth annual meeting of the Susquehanna Dental Association was held in Williamsport, Pa., May 19, 20 and 21, 1908, and officers for the ensuing year were elected as follows: President, C. C. Laubach, Scranton; Vice-President, H. M. Black, Wilkes-Barre; Secretary, G. C. Know, Scranton; Treasurer, C. C. Walker, Williamsport.

LEBANON VALLEY DENTAL ASSOCIATION.

The thirty-third annual meeting of the Lebanon Valley Dental Association was held in York, Pa., May 12, 13 and 14, 1908, and officers for the ensuing year were elected as follows: President, W. B. Manstellen; Vice-President, H. Elmer Trostel; Recording Secretary, George F. DeLong; Corresponding Secretary, J. T. Blair; Treasurer, C. B. Wagner.

NEBRASKA STATE DENTAL SOCIETY.

The thirty-second annual meeting of the Nebraska State Dental Society was held in Omaha, May 19, 20 and 21, 1908, and officers for the ensuing year were elected as follows: President, E. A. Meservey, Kearney; Vice-President, J. M. Prime, Oxford; Secretary, E. H. Breuning, Omaha; Treasurer, H. F. King, Fremont. The next meeting will be held in Lincoln.

ARKANSAS DENTAL ASSOCIATION.

The annual meeting of the Arkansas Dental Association was held in Little Rock, May 26 and 27, 1908, and officers for the ensuing year were elected as follows: President, R. B. Sadler, Paris; 1st Vice-President, J. E. Andres, Harrison; 2d Vice-President, A. G. Ragland, Fort Smith; Secretary, L. K. Charles, Eureka Springs; Corresponding Secretary, I. M. Sternburg, Fort Smith; Treasurer, W. T. Rowland, Bentonville. The next meeting will be held in Hot Springs.

SOUTHERN BRANCII OF THE NATIONAL DENTAL ASSOCIATION.

The eleventh annual meeting of the Southern Branch of the National Dental Association was held in Birmingham, Ala., May 12, 1908, and officers for the ensuing year were elected as follows: President, J. E. Chase, Ocala, Fla.; 1st Vice-President, H. Clay Hassell, Tuscaloosa, Ala.; 2d Vice-President, W. W. Westmoreland, Columbus, Miss.; 3d Vice-President, E. L. Gunn, Gadsden, Ala.; Recording Secretary, C. H. Frink, Fernandina, Fla.; Corresponding Secretary, W. G. Mason, Tampa, Fla.; Treasurer, B. D. Brabson, Knoxville, Tenn. Executive Committee, Charles Alexander, Char-

lotte, N. C., and A. J. Cottrell, Knoxville, Tenn. The next meeting will be held in Anniston, Ala.

FIRST DISTRICT (MICH.) DENTAL SOCIETY.

The first annual meeting of the First District Dental Society was held in Detroit, May 14, 1908, and officers for the ensuing year were elected as follows: President, George F. Burke, Detroit; Vice-President, E. M. Graham, Detroit; Secretary, J. A. Walker, Detroit; Treasurer, R. M. Muir, Marine City.

MISSISSIPPI DENTAL ASSOCIATION.

The anual meeting of the Mississippi Dental Association was held at Jackson, Miss., June 9, 10 and 11, 1908, and officers for the ensuing year were elected as follows: President, W. R. Wright, Jackson; 1st Vice-President, C. F. Boger, Natchez; 2d Vice-President, W. H. Reaben, McComb City; Secretary, L. B. Price, Corinth; Journalist, E. A. Johnson, Holly Springs.

KANSAS DENTAL ASSOCIATION.

The thirty-seventh annual meeting of the Kansas Dental Association was held in Topeka, May 11, 12 and 13, 1908, and officers for the ensuing year were elected as follows: President, L. D. Hodge, Arkansas City; 1st Vice-President, E. Bumgardner, Lawrence; 2d Vice-President, S. J. Renz, Leavenworth; Secretary, W. H. Fessenden, Ottawa; Treasurer, J. Scott Walker, Chetopa; Supervisor of Clinics, A. G. Wilcox, Junction City.

LOUISIANA STATE DENTAL SOCIETY.

The thirtieth annual meeting of the Louisiana State Dental Society was held in New Orleans, May 13 and 14, 1908, and officers for the ensuing year were elected as follows: President, H. J. Feltus, Baton Rouge; Vice-President, J. Rollo Knapp, New Orleans; 2d Vice-President, O. L. Breaud, Thibodaux; Recording Secretary, O. J. Reiss, New Orleans; Corresponding Secretary, A. L. Plough, New Orleans; Treasurer, W. Milton, Miller. The next meeting will be held in New Orleans.

NEW JERSEY STATE DENTAL SOCIETY.

On account of the large increase of clinics and exhibits, the New Jersey State Dental Society has been compelled to seek larger quarters than heretofore, and the Executive Committee have been able to secure the beautiful new Casino, situated on the beach front, with excellent accommodation for clinics, exhibitors and meetings, and abundant space, perfect light, and delightful ocean breeze.

The Casino is the most superior meeting place in Asbury Park and within easy access from trolleys and trains. To realize the beauties and charms of this new meeting place will necessitate attendance at the annual

meeting of the New Jersey State Society; meeting commences, as heretofore announced, July 15, and continues through the 16th and 17th.

CHARLES A. HECKER, D.D.S., Secy.,
29 Fulton St., Newark, N. J.

VERMONT STATE DENTAL SOCIETY.

At the thirty-second annual meeting of th Vermont State Dental Society, held in Montpelier, May 20-22, 1908, the following officers were elected for the ensuing year: President, Harry F. Hamilton, Newport; First Vice-Pres., Dr. Charles F. Meacham, Bellows Falls; Second Vice-Pres., Dr. A. Z. Cutler, Bennington; Rec. Secy., Dr. Thomas Mound, Rutland; Cor. Secy., Dr. Grace L. Bosworth, Rutland; Treasurer, Dr. W. H. Munsell, Wells River; Executive Committee, Dr. L. E. Mellen, Middlebury; Dr. F. H. Brown, Enosburgh Falls; Dr. Dana E. Dearing, South Royalton.

The next meeting will be held the third Wednesday in May, 1909, the place of meeting to be decided by the Executive Committee.

THOS. MOUND, D.D.S., Secy.,
Rutland, Vt.

NATIONAL DENTAL ASSOCIATION.

A month nearer the convening of the N. D. A. finds the clinic program nearing its completion. Professional men who expect to attend the July meeting may easily recognize the fact that this special feature will be well worth a trip to Boston. Returns have yet to come in, but that the profession may have an earnest of good things to come, a partial program has been arranged for publication.

It will be seen that those interested in any one or all of the operations in metal fillings, silicates, porcelain inlays and restorations, crown and bridgework, prosthetics and dental surgery, will find something of a helpful value. The surgical clinics and laboratory exhibits will be of high order. The other groupings of clinics are in the hands of competent men who will contribute to the general interest attending a N. D. A. clinic.

CHAIR CLINICS.

Ainsworth, George C., D.D.S., Boston, Mass.:

1. Contour gold filling—matrix without preliminary separation.
2. Will demonstrate the making and application of his automatic spreading appliance, as used in orthodontia.

Annis, E. R., D.D.S., Winnebago, Minn.:

Gold foil and cement used in making contour amalgam fillings.

Argue, J. E., D.D.S., Red Lake Falls, Minn.:

Casting a Richmond crown without breaking facing and casting cap pin and attachment all in one cast.

Baker, George T., D.D.S., D.M.D., Boston, Mass.:

Pressure anesthesia.

Ball, F. E., D.D.S., Fargo, N. D.:
Orthodontia, showing appliances in the mouth.
Ballachey, F. A., D.D.S., Buffalo, N. Y.:
Ascher's enamel filling.
Beemer, Horace I., D.D.S., Newton, N. J.:
Gold filling: Distal surface of upper first bicuspid according to the methods of Dr. Black.
Bowles, Shirley W., D.D.S., Washington, D. C.:
Use of the Greenough microscope at the dental chair.
Burkhart, A. P., M.D.S., Buffalo, N. Y.:
Obtunding sensitiveness.
Carlson, K. Edward, D.D.S., St. Paul, Minn.:
Gold filling in bicuspid on mesioincisal.
Carr, Isaac N., D.D.S., Durham, N. C.:
Ascher's artificial enamel.
Chilcott, Langdon S., D.D.S., Bangor, Me.:
Combination fiold filling. Cavity lined with non-cohesive gold, and filled with cohesive gold.
Conzett, J. V., D.D.S., Dubuque, Iowa:
Gold filling.
Cudworth, Wm. H., D.D.S., Milwaukee, Wis.:
Porcelain inlay, Jenkins.
Curtis, G. Lenox, M.D., D.D.S., New York City:
Surgery.
De Mille, P. E., D.D.S., Baldwin, Wis.:
New method bridgework.
Gaylord, Albert N., D.D.S., New York City:
Method of reducing bulk of wax models in inlay work.
Gough, Frank A., D.D.S., Brooklyn, N. Y.:
Orthodontia—plaster impression.
Greene, J. W., D.D.S., Chillicothe, Mo.:
Preventive dentistry, using silver nitrate, etc.
Green, Maurice, D.D.S., New York City:
Ethyl chlorid as a general anesthetic.
Head, Joseph, D.D.S., D.M.D., Philadelphia, Pa.:
Two anterior approximal fillings in porcelain.
Hetrick, Frank O., D.D.S., Ottawa, Kan.:
Gold filling inlay.
Hutchinson, R. G., Jr., D.D.S., Brooklyn, N. Y.:
Surgical treatment of pyorrhea.
Jefferis, C. R., D.D.S., Wilmington, Del.:
Ascher's Artificial Enamel.
Jungman, J. W., D.D.S., Cleveland, Ohio:
Oral prophylaxis.
Kelsey, James H., D.D.S., Erie, Pa.:
Oral prophylaxis and treatment of pyorrhea alveolaris.

Land, C. H., D.D.S., Detroit, Mich.:
The artificial enameling of vital teeth.
Luttropp, Knut J., D.D.S., D.M.D., Boston, Mass.:
Porcelain inlay.
Luttropp, S., D.D.S., D.M.D., Boston, Mass.:
Contour gold filling.
McAlpin, A., D.D.S., Bradford, Pa.:
Anchor screws with "Ascher's Enamel" and plasters.
McMillen, D. J., M.D., D.D.S., Kansas City, Mo.:
Non-cohesive gold.
Mitchell, Wm. H., D.D.S., Bayonne, N. J.:
Vibration and dental massage.
Purvis, Robert, D.D.S., Camden, N. J.:
Local anesthetic extracting.
Rietz, Hugo C., D.D.S., Boston, Mass.:
Contour gold filling.
Riggs, Chas. H., D.D.S., Hartford, Conn.:
Immediate root filling.
Rose, Chas. L., D.D.S., Spokane, Wash.:
Cast posts for pinless crowns.
Rundle, V. M., D.D.S., Newton, N. J.:
Gold filling, mesial surface of upper bicuspid, using Dr. Black's method.
Ryan, Clarence M., D.D.S., Syracuse, N. Y.:
Gold filling.
Savage, G. Arthur, D.D.S., Worcester, Mass.:
1. Jacket crowns.
2. (a) Restoration of central incisor with porcelain.
(b) Gold Inlay.
Schamberg, M. I., M.D., D.D.S., New York City:
Dental radiography.
Stanley, Ned. A., D.M.D., New Bedford, Mass.:
Treatment of case of pyorrhea, using the Carr instruments.
Starbuck, A. W., D.D.S., Denver, Colo.:
Porcelain inlay.
Stevenson, G. E., D.D.S., Liberty, Ind.:
Gold filling, using Keeton gold.
Thorpe, Burton Lee, M.D., D.D.S., St. Louis, Mo.:
Filling of approximal or labial cavity with Translux enamel.
Tompkins, Henry H., D.D.S., Utica, N. Y.:
The construction of porcelain crowns without the use of models.
Tuttle, Chas. P., D.D.S., Camden, N. J.:
Obtunding sensitive dentin with Meyer spring.
Weeks, S. Merrill, D.D.S., Philadelphia, Pa.:
Orthodontia.
White, Wm. A., D.D.S., Phelps, N. Y.:
Ascher's Artificial Enamel.

Work, C. M., D.D.S., Ottumwa, Iowa:
Porcelain inlay.

TABLE CLINICS.

Abbott, C. Edson, D.D.S., Franklin, Mass.:
a. Asbestos and alcohol investments for crowns, small bridges, etc.
b. Gold and amalgam fillings over soft cement, condensed under linen tape.
c. Pinned Richmond crowns for fractured roots.
d. Ligature wrapped with unvulcanized rubber for cervical gum retraction.

Albee, E. H., D.D.S., Concord, N. H.:
Quickly made splint for accident cases.

Albray, Raymond A., D.D.S., Newark, N. J.:
Splint for use in pyorrhea.

Baldwin, H. P., D.D.S., Manchester, N. H.:
a. Plate strengthener for partial lower plates.
b. Case abnormal teeth.

Blaisdell, Edwin C., D.M.D., Portsmouth, N. H.:
Easy way to get into bicuspid and molar canals.

Bogue, E. A., M.D., New York City:
Orthodontia for children.

Bordnen, Charles M., D.D.S., Shenandoah, Pa.:
Simple method of banding crowns.

Bowers, George A., D.D.S., Nashua, N. H.:
Cast fillings and bridges, using amateur outfit.

Bridge, Walter G., D.M.D., Boston, Mass.:
A practical demonstration with the blowpipe.

Brown, Byron, D.D.S., Brooklyn, N. Y.:
Porcelain crowns.

Bush, Roy Allen, D.D.S., Worcester, Mass.:
Showing method of preparing plaster cast to obtain the greatest amount of adhesion to the mouth of vulcanite denture.

Bradshaw, C. A., D.D.S., Buffalo, N. Y.:
New cast inlay machine.

Clapp, Harold M., D.D.S., Utica, N. Y.:
Orthodontia.

Cook, Wm. F., D.D.S., Jersey City Heights, N. J.:
Banding Logan crowns.

Cross, Harold DeW., D.M.D., Boston, Mass.:
Anatomical articulation.

Cruzen, E. E., D.D.S., Baltimore, Md.:
Porcelain work.

Curtis, W. S., D.D.S., Montpelier, Vt.:
One-tooth removable bridge, in connection with gold inlays.

Custer, L. E., D.D.S., Dayton, Ohio:
Electrical casting of Taggart inlay.

Dameron, E. P., D.D.S., St. Louis, Mo.:
Possibilities of casting in metals.

Delabarre, Frank A., D.D.S., M.D., Boston, Mass.:
Orthodontia model.
Evslin, Leo E., D.D.S., Peoria, Ill.:
The Evslin interchangeable teeth.
Faxon, F. S., D.D.S., D.M.D., Brockton, Mass.:
Treatment of pyorrhea and use of practical splint for loose tooth.
Fritz, Gustav E., D.D.S., Peoria, Ill.:
The Evslin bridgemeter.
Gerrish, C. H., D.D.S., Exeter, N. H.:
Crowns, napkins and non-cohesive gold.
Gordy, A. P., D.D.S., Columbus, Ga.:
Orthodontia.
Greene, J. W., D.D.S., Chillicothe, Mo.:
Absolute test impressions and articulations.
Greene, F. A., D.D.S., Geneva, N. Y.:
Original method of starting gold fillings in proximal cavities.
Grieves, C. J., D.D.S., Baltimore, Md.:
The McNeill bridge repair.
Griswold, Gilbert M., M.D.S., Hartford, Conn.:
The burnished "Co-ad" filling.
Hardy, Chas. D., D.D.S., Summit, N. J.:
Simple inexpensive device for casting gold inlays.
Hardy, George E., M.D., D.D.S., Baltimore, Md.:
Bridge repair.
Harting, H. H., M.D., Boston, Mass.:
X-ray in dentistry.
Harrison, A. M., D.D.S., Rockford, Ill.:
Zinc-silicate lining for porcelain inlays.
Hough, Willie L., D.D.S., Laconia, N. H.:
Removable and fixed bridge.
Hulick, Wm. O., D.D.S., Cincinnati, Ohio:
Bridge on converged teeth.
Jameson, Norman L. D.D.S., Philadelphia, Pa.:
Casting gold inlays and crowns.
Johnson, E. A., D.M.D., Boston, Mass.:
X-ray.
Jones, Chas. F., D.D.S., Elizabeth, N. J.:
Oral deformities and fractures; practical cases.
Kelsey, Harry E., D.D.S., Baltimore, Md.:
Orthodontia.
Ketner, Frank W., D.D.S., Hudson, N. Y.:
To be announced.
Lansing, A. L., D.D.S., New York City:
To be announced.
Le Cron, D. O. M., D.D.S., St. Louis, Mo.:
Cavity preparation for gold and porcelain inlays.

Low, Frank W., D.D.S., Buffalo, N. Y.:
Systemic medication to prevent the decay of teeth of women during pregnancy.

McCarthy, John W., D.D.S., Holyoke, Mass.:
Anatomy of the head.

McNulty, Thos. P., D.D.S., Gouverneur, N. Y.:
The readapting of ill-fitting dentures.

McMillen, D. J., M.D., D.D.S., Kansas City, Mo.:
Inlay cavity preparation.

Miller, Chester C., D.D.S., Plainfield, Ind.:
The marks of congenital syphilis.

Niles, Edward S., D.D.S., Boston, Mass.:
Beryllium silicate fillings.

Onderdonk, T. W., D.D.S., New York City:
Method of obtaining wax models for cast inlays.

Palmer, Stephen, D.D.S., Poughkeepsie, N. Y.:
Gold or porcelain, which?

Parkhurst, Chas. E., A.B., D.M.D., Somerville, Mass.:
To be announced.

Payson, Will S., D.D.S., Castine, Me.:
Anchorage of alloy fillings and the matrix.

Peeso, Fred A., D.D.S., Philadelphia, Pa.:
Removable bridgework and different forms of abutments for same.

Porter, Ross, D.D.S., Oil City, Pa.:
Making wax impressions for gold castings.

Pullen, H. A., D.D.S., Buffalo, N. Y.:
Orthodontia.

Ridout, J. B., D.D.S., St. Paul, Minn.:
Cast novelties.

Robinson, J. A., D.D.S., Morrisville, Vt.:
Ingenious contrivances for making engine belts.

Sawyer, A. J., D.D.S., Manchester, N. H.:
a. Removable bridgework.
b. One-tooth bridge.
c. Banded root crown.

Seymour, Robt., D.D.S., Philadelphia, Pa.:
Casting gold inlays, using the Seymour machine.

Schermerhorn, A. R., D.D.S., Syracuse, N. Y.:
Porcelain crowns.

Shannon, G. H., D.D.S., Cambridge, N. Y.:
The use of the automatic right-angle mallet.

Simpson, O. H., D.D.S., Dodge City, Kan.:
A new crowning system.

Slack, W. F., D.D.S., Manchester, N. H.:
New method of applying force in orthodontia.

Smith, D. D., D.D.S., Sandusky, Ohio:
Two accidents, and a way out of each.
Strang, Robert H. W., D.D.S., Bridgeport, Conn.:
Orthodontia.
Stanton, Fred'k L., D.D.S., New York City:
The relation of rhinology to orthodontia.
Steeves, Alice M., D.D.S., Boston, Mass.:
Dental ligatures and wedges.
Stewart, Lee K., D.D.S., Chicago, Ill.:
Large gold inlays.
Taylor, Levi C., D.D.S., Hartford, Conn.:
Junior hygienic fillings.
Tousey, Sinclair, M.D., New York City:
X-ray and ultra-violet ray in dentistry.
Tucker, E. J., D.D.S., Roxbury, N. C.:
To be announced.
Weston, W. Harry, D.M.D., Nashua, N. H.:
Simple gold and platinum inlays.
Wheeler, C. W. B., D.D.S., New York City.:
Orthodontia (Jackson system).
Wilbur, C. A., D.D.S., Pawtucket, R. I.:
Cast gold inlays.
Young, Douglas H., D.D.S., Attica, N. Y.:
A method of treating prominent alveolar process.
Young, J. Lowe, D.D.S., New York City:
Orthodontia.
Young, W. B., D.D.S., Jacksonville, Ill.:
Some of the uses of a casting machine.

SURGICAL.

Cheney, W. E., A.B., M.D., Boston, Mass.:
Surgery in infirmary, with lecture in amphitheater, using projection apparatus.
Fillebrown, Chas. D., M.D., Boston, Mass.:
Cleft palate.
Reynolds, C. H., D.D.S., Clintondale, N. Y.:
Arresting buccal hemorrhage without the application of liquid hemostatics.
Schamberg, M. I., M.D., D.D.S., New York City:
Oral surgery.
Smith, M. C., M.D., D.D.S., D.M.D., Lynn, Mass.:
To be announced.
Strout, B. H., D.D.S., Taunton, Mass.:
Epulis.
Teter, C. K., D.D.S., Cleveland, Ohio:
An oral operation under prolonged nitrous oxid and oxygen anesthesia.

LABORATORY EXHIBITS.

Dearborn, G. V. N., A.M., M.D., Ph.D., Boston, Mass.:
Physiology exhibit and demonstration in laboratory.
Bates, George A., M.Sc., D.M.D., Auburndale, Mass.:
Leary, Timothy, M.D., Roxbury Mass.:
The common bacteria of the mouth cavity and lesions arising therefrom.
Smith, H. Carleton, Ph.G., Boston, Mass.:
Saliva.

The complete program, with full titles, dates and places of meeting, with all necessary information with regard to the clinics will appear in the July journals.

GEORGE E. SAVAGE,
Chairman Clinic Section,
518 Main St., Worcester, Mass.

LATEST DENTAL PATENTS.

885,018. Artificial tooth, H. E. S. Chayne, New York, N. Y.
886,140. Apparatus for forming dental structures, J. A. Lentz, Phœnix, Ariz.
886300. Dental vulcanizer, F. W. Korb and W. F. Hieber, Cleveland, Ohio.
887,181. Toothbrush, E. D. Barnes, Tarboro, N. C.
887,478. Anterior matrix-clamp, J. W. Ivory, Philadelphia, Pa.
887,528. Dental appliance, J. B. Schafhirt, Washington, D. C.
887,577. Artificial tooth, L. and H. Bernstein, New York, N. Y.
888,011. Tooth-powder holder, P. S. Hay, Montgomery, Ala.
888,138. Toothbrush, V. C. Bell, New York, N. Y.
888,297. Combined rubber-dam and tooth-backing punch, H. M. Bell, Houston, Texas.
888,307. Dental crown heater, E. W. Dodez, Fort Wayne, Ind.
888,310. Dental dam holder. C. A. Conover, Newburgh, N. Y.

News Summary.

JAP TO GRADUATE.—Kadzuo Omura, a Japanese dental student at Marquette University, graduated May 25 with honors and left at once for Tokio to become an assistant to the royal dentist.

A BACK-HANDED COMPLIMENT.—Wife (who has just returned from the dentist)—I shall be awfully stupid now. Husband—Why so, my dear? Wife—I have had all my wisdom teeth pulled out. Husband (with the best intention in the world)—Of course, my love, you know it is nothing but a superstition—the idea that wisdom teeth have anything to do with wisdom. If you were to have every tooth in your head drawn it couldn't make you any stupider, you know. He succeeded in smoothing matters over, but it was a narrow escape.

To Keep the Finger Nails Clean While Working in the Laboratory.—Draw the finger nails over pink wax or soap, filling all the space under the nails. This can afterward be easily removed and the hands washed.—C. W. Siefkin, *Western Dental Journal.*

Dentist's Ruling Passion.—Mrs. Stubb—I declare, John, there goes our dentist. Mr. Stubb—What of it? Mrs. Stubb—Why, what in the world is he doing wandering about in such an awful storm? Mr. Stubb—Maybe he is looking for the teeth of the gale, Maria.

Dentistry Stops Weak Heart.—Altoona, Pa., May 23.—Following the extraction of a tooth, Oliver B. Fissell, aged 15, was seized with convulsions and died in two hours. Doctors say it was the shock of having the tooth pulled, affecting his weak heart, that caused his demise.—Philadelphia *Record.*

Suicides.—Henry W. McCullough, a dentist of Angola, N. Y., committed suicide by hanging, May 31, 1908.—Andrew J. Yeager, a dentist of Joplin, Mo., committed suicide by drinking phenol, May 26, 1908.—H. N. Lancaster, a well-known dentist and author of Chicago, committed suicide by shooting, May 24, 1908.

Inlay Bridges.—I want to sound a note of warning regarding the assembling of inlay bridges. If contact points of abutment teeth are not tight against the teeth standing anteriorly and distally to them, ligate firmly just before taking the impression and bite preparatory to the final assembling of inlays and dummies.—Elliott R. Carpenter, *Dental Review.*

The Illinois State Dental Society, which met in Springfield recently, heartily and enthusiastically endorsed Governor Deneen and his administration. This ought to help some, as every member of the organization has a "pull."

Jury and Dentist Disagree.—Canon City.—A jury in the District Court decided that $3,308 was too much to pay for the extraction of an abscessed tooth, and consequently returned a verdict in favor of N. E. Barnes, a prominent mining man of this county, who was sued for that amount by Dr. G. Lenox Curtis of New York City.—Denver (Colo.) *Times.*

Oldest Set of False Teeth.—The oldest set of false teeth in the United States was exhibited at the convention of the Kansas State Dental Association by Dr. L. D. Blacklin of Herington. They are made of pure ivory and are said to have been carved in the year 1750. The upper and lower sets are fastened with a spring. They were used only for appearance.

Hold Convention on Water.—The fifty-second annual convention of the State Dental Society of Michigan will be held in a novel way. June 10 the society will start from Detroit on the "City of Mackinac" and take a trip up the lakes to the "Soo," the convention being held on board the steamer. Exhibits will be on display from all the leading dental supply houses. Some of the most noted members of the profession have been secured to read

papers and hold clinics. The convention will continue four days. A pleasure trip will be taken from the "Soo" out into Lake Superior and a visit made to Mackinac Island.

LOCAL ANESTHETICS.—The application of clamp bands to the molar teeth is sometimes painful where it might be absolutely painless if a local anesthetic was used. It is seldom necessary to inject the same, but simply paint it on the gums. There is no need to make a little patient suffer even a twinge of pain that can so easily be avoided.—*Western Dental Journal.*

KEEP SMILING.—Don't carry a grouch with you; it is a most useless burden and loads you down till you can't carry a message of good cheer and happiness. Especially, don't tote around a grouch against some brother dentist. No matter how smoothly you run him down, the public always sees through it and reads you like a book. Forget it!—*Western Dent. Jour.*

DR. V. E. TURNER HONORED.—May 23 the Raleigh Dental Society gave a banquet in honor of Dr. V. E. Turner of Raleigh, N. C., to commemorate the fiftieth anniversary of his professional career. Dr. Turner's practice has extended from 1858 to 1908. The rounding out of a half century of dental career has not been paralleled by any other practitioner in the South.

DIED OF BLOOD POISONING.—James Ernest Loughlin, the 8-year-old son of Mr. and Mrs. James W. Loughlin, died at the family residence at Marriott at 7 o'clock last evening after an illness of only a week. The boy had been troubled considerably with toothache for some time and he was taken to a dentist for treatment. The tooth was found to be abscessed and the dentist extracted it. Blood poisoning set in and death resulted.—Ogden City (Utah) *Examiner.*

INLAY INVESTMENT.—The following is a non-shrinking, non-changing investment, specially good for gold inlay work:

Plaster of paris	1 part
Silex, pulv.	1 part
Tenax (pulv. asbestos)	9-10 part
Soapstone	1-10 part

A trial of this will be most satisfactory. All of the ingredients can be had at any dental depot.—W. CLYDE DAVIS, *Western Dental Journal.*

ILLEGAL PRACTITIONERS.—A dentist of Santa Ana, Cal., was arrested May 20, charged with practicing dentistry without a license. He pleaded not guilty and deposited $50 for his appearance for trial.—A dentist of Peoria, Ill., convicted of practicing without a license, was fined $50, May 16.—A dentist of Carthage, Ill., was arrested May 11 for practicing without a license.—A dentist of Seattle, Wash., paid $110.85, May 19, fine and costs, for practicing without a license.—Another dentist of Seattle, arrested for practicing without a license, pleaded guilty and paid a fine of $100, May 6.—Several other dentists of Seattle have had complaints issued against them. The assistant prosecuting attorney recently made dentists who had been

convicted pay fines and costs in prosecutions which the Supreme Court passed upon and which netted the county and state about $1,000.

WHERE IT FAILS.—"Silence is golden," remarked the party with the quotation habit. "Perhaps it is," rejoined the contrary man, "but a dentist has never yet been able to fill teeth with it."

WARM THE ALCOHOL BEFORE WIPING OUT A CAVITY.—It affords considerable and pleasing relief to patients if, when wiping out a cavity in a vital tooth with alcohol, the alcohol be warmed. This may be easily and almost instantly done by igniting the saturated swab and quickly blowing it out.—*Northwestern Dental Journal.* [Don't forget to blow it out.—Editor DIGEST.]

LABELING BOTTLES.—A rapid method of inscribing the names of our remedies upon their glass containers is by means of a small carborundum stone in the dental engine. With a little practice this may be done as rapidly as an ordinary label can be written. There is nothing to become discolored or rubbed off and the containers present a much neater appearance.—ROBERT WAKEFIELD, *Dental Summary.*

ROBBERIES.—Dr. B. K. Simonek, Chicago, gold valued at $300, in May.—J. W. Mather, Lamoni, Ia., office entered May 19 and gold and platinum valued at $20 taken.—Dr. J. S. Burbank, Brockton, Mass., supplies valued at $115, May 11.—Dr. H. J. Hughes, Kansas City, Kan., articles valued at $50, May 16.—Drs. J. T. Crews, J. A. Arrington and J. A. Newman, Jackson, Tenn., gold and materials valued at $200, May 17.

DENTISTS WANT LEGISLATION.—Legislation will be asked by the Illinois State Dental Society to exempt dentists from serving on juries, to amend the rules of the Dental Board of Illinois affecting practitioners from other states, and to have a law enacted providing for the care of the teeth of inmates of the St. Charles Home for Boys, the Girls' Home at Geneva, and the Soldiers' Orphans' Home at Normal.—Chicago *Tribune.*

MASSAGE THE GUMS.—We are taught that one of the best things in the treatment of pyorrhea after medication is that the patient should massage the gums, rubbing the gums toward the crown of the teeth. That has a tendency to push out all foreign substances, and if any pus forms it pushes that out, and by wiping it away with absorbent cotton or napkins the pus can be kept out of the system, and it also causes a normal circulation of the blood in the gum tissue.—*Dental Summary.*

"DON'T ATTEND CHURCH TO ADVERTISE MOLARS," ADVICE TO YOUNG DENTISTS.—Don't go to church on Sunday just to get patients. Don't make the mouth of a rich patient a young gold mine merely because he has money. Don't be a hog if you make a discovery—tell the world about it. These and a few other don'ts as well as many "do's" were given to the graduates of the Northwestern University Dental School by Prof. Charles Louis Mix. "The ethics of the profession of a dentist are exacting," said Professor Mix, "more so than any other one. You should be men. Don't join

churches and clubs merely to become a petty grafter. Don't tell one of your patients that he had thirty cavities in his teeth just to get his money. Tell him the truth, and try to educate the public to take care of its teeth so that in time there will be no more dentists. Try to advance in your profession, but never do it at the expense of your honor."

WEAKNESS OF CAST GOLD.—Gold repeatedly remelted under the blowpipe is apt to lose its tenacity, although guarded from admixture of base metals, and can only be restored to its normal condition by a proper metallurgic treatment. When scraps of gold have been melted into a button, the button should be tested by a few sharp blows with a hammer before being used in any casting process. If cracks appear, to use it for a cast inlay or a bridge is to invite trouble later.—J. Q. BYRAM, *Dental Summary.*

WARNING.—As I look over my own practice, it seems to me, I have been in the habit of neglecting many things. I think the drift of dentistry in the last few years has been rather to look too much into the new and neglect the old, and we are so engrossed with our porcelain fillings and gold castings that we are apt to forget some of the fundamental principles of practice which have a great deal more bearing as regards the appearance, the usefulness and the comfort of the teeth.—L. S. TENNEY, *Dental Review.*

SAFER TO REGULATE EARLY.—At first thought it seems dangerous to regulate teeth at the time of eruption, but investigation shows that this is the age of greatest safety. At this time the roots of the teeth are not fully developed, and the apical foramen is very large; a tooth may undergo all kinds of twisting and pulling without danger of strangulation on account of the great mass of soft tissue at the end of the root. The alveolar process does not invest the tooth as closely at this time as later on, which makes the movement easy. The early age is the safest age as well as the best time for regulating.—*Western Dental Journal.*

FRACTURED BONES OF FACE.—Menestrina reports the case of a miner injured in the head by premature blast of dynamite. The frontal, sphenoid, ethmoid, two nasal, two superior maxillary, right lachrymal, two malar, turbinated, vomer and inferior maxillary bones were more or less fractured and comminuted. Fragments of coal, bone and powder came away daily in the dressing. The patient hovered between life and death for four weeks, delirious nearly all the time, but gradually regained consciousness at the end of the fourth week. The mental condition of the patient three months later was strangely unimpaired considering the extent of the injury. There was no impediment of taste, hearing or smell, and the only sensory disturbance was a marked hyperesthesia in structures supplied by the superficial and portion of the deep cervical plexuses (ascending branches) and descending branches (supraclavicular). There is no condition present which would account for a central origin, and nothing is perceptible in the course of the nerve to indicate a peripheral origin.—*Jour. Amer. Med. Assn.*

ROOT AMPUTATION.—In case of pyorrhea alveolaris occurring about the lingual root of an upper molar, I would not leave any condition that would allow deposits to be held in contact with the other roots. I would take a cross-cut or fissure bur and cut from the mesial to the distal through the center of the tooth and then extract the lingual root with its portion of the crown; then on the two buccal roots I would place a long, flat crown. With a lower molar involved I would cut from the buccal to the lingual between the mesial and distal roots and extract one. I consider that better practice than cutting off the end of the root.—W. H. G. LOGAN, *Dental Review.*

A METHOD OF OBTAINING AN ACCURATE MODEL IN MELOTTE'S METAL.—Impression is taken of cavity in baseplate guttapercha, which is invested in plaster. When set, all over-hang is cut away to allow of ready separation. When impression is invested it is carbonized over gum camphor, a mouth blowpipe may be used to blow the carbon into the fine points and deep parts of the impression. A rubber ring is then placed over it, and Melotte's metal is poured in quite hot and gently jarred down. Upon separation it will be found that the carbon has produced a surface over which the Melotte's metal has run to all the fine parts of the impression.—H. N. ORR, *Dental Review.*

REMOVING BANDS.—It is not comfortable to the patient to remove cemented bands from teeth being regulated, unless care is used. Many a band can be loosened by working the point of an explorer under the edge and gradually breaking up the attachment. If the band is to be thrown away it may be cut in two if the explorer method will not work. A thin screwdriver-shaped instrument is worked under one edge and turned from side to side until the band starts to tear, when the break may be followed up and the band torn entirely across with little difficulty and little pain. This is better than cutting with carborundum or diamond wheels, with no danger of injuring the enamel.—*Western Dental Journal.*

DENTISTS WANT EVANS FUND FOR POST-GRADUATES.—Assuming that Dr. Thomas W. Evans intended that practicing dentists should be benefited by the Museum and Dental Institute, provided for in his will, and not the undergraduates particularly, a number of prominent dentists of this city at a mass meeting held May 21st vigorously protested against the University of Pennsylvania or any other university or college being allowed to supervise the institute. The meeting was the result of an agitation growing out of the discovery that the trustees of the Evans Institute had asked for advice on the best methods of conducting the institute and that Dr. Edward C. Kirk, answering for the University of Pennsylvania, had made suggestions which were interpreted by some as meaning that the university sought to gain control of the institute. The general sentiment, as expressed at the meeting, seemed to be that Dr. Evans intended the museum and institute to benefit his "beloved dental profession" and not those intending or preparing to enter it. It was suggested that a committee be appointed to confer with the trustees to be composed of one member from each of the Philadelphia

dental colleges. This was placed in the form of a resolution and adopted. —Pittsburg *Press.*

LINER WILL CARRY DENTIST; NEW YORKER STARTS NEW JOB.—When the new Italian steamship Principe di Udine of the Lloyd Sabaudo service left New York, June 6, the boat had on board the first dentist regularly attached to a transatlantic liner. The Principe di Udine arrived on its maiden voyage a few days previous, but the dental innovation was not installed until Dr. B. Barrymore Marco, purveyor to the opera stars of the Manhattan and the Metropolitan opera, southerner by birth and New Yorker by virtue of long residence, took his chair and his drills, his drugs and his other "weapons" and was installed in one of the luxurious suites aboard the new vessel from the Mediterranean.

PROPHYLAXIS.—The majority of persons have never even learned to rinse the mouth properly, not to mention brushing. Teach the patient to stir up the water so vigorously and strenuously that it will rush between the teeth, and tell him to practice that, and when you see him again see if he has learned how to do it. It is one of the most necessary things—a vigorous rinsing of the mouth. A few years ago a patient presented himself with his teeth in almost perfect condition. He said he had never had anything done to his teeth. I looked at the teeth and asked him if they had been brushed; there was no decay or tartar. I said, "You have been brushing your teeth, have you?" He said, "No, but I wash them every morning before breakfast." I said, "How?" and he showed me how he rinsed them vigorously and took a napkin and wiped them off. He said, "I do that as soon as I get up from the table. I do that, and then pick my teeth. I have been doing that ever since childhood—a vigorous rinsing and picking of the teeth."—HORACE WARREN, *Dental Summary.*

EXAMINING BOARD AFFAIRS.—At the annual meeting of the Illinois State Dental Society the committee on legislation recommended the passage of a law enabling the State Dental Board to practice reciprocity in the issuing of licenses to dentists of other states who possess the standard qualifications required by the laws of Illinois.—At the May meeting of the Mississippi Board 28 out of 50 applicants were successful in passing the examination.—The adoption of resolutions criticising a member of the Governor's council for alleged interference in connection with the appointment of a member of the State Board of Registration of Dentists formed a feature of the closing session of the annual meeting of the New Hampshire State Dental Society. The Society unanimously endorsed the reappointment of Dr. Frederick H. Brown on the State Board, and a member of the Governor's council used his influence to defeat the petition.—At the last session of the Ohio Legislature a law was passed making it a misdemeanor for a person practicing dental surgery, who is not a graduate of a dental college, to attach the prefix "Dr." or the affix "D.D.S." to his sign, letterhead, billhead, or, in fact, to use such titles in any way whatever. It is stated that the State Board intends to investigate the titles of every dentist in Ohio and see to it that no illegal use of the titles is made.—A dentist of Portland,

Ore., has won a victory over the State Board of Examiners, at whose instigation he was twice arrested on a charge of practicing dentistry without registering his certificate. On one charge he was convicted and fined. An appeal was taken to the Circuit Court, where he was tried before a jury. The jury acquitted him after a short deliberation, though no testimony at all was offered in his defense, resting the case entirely on the evidence submitted by the prosecution. As a result of the acquittal a similar charge was dismissed.—The Oklahoma State Board at its last meeting examined 25 applicants for license to practice in the state, and issued licenses to 150 others, who were practicing in the state when statehood was declared and did not have to pass an examination. There are now 600 dentists in Oklahoma.

Mouth Breathing.—In children adenoid vegetations in the nasopharynx are responsible for a large majority of the mouth-breathers, and no examination is so satisfactory as palpation with the forefinger rapidly passed back in the throat to one side, and then insinuated behind the soft palate. The etiologic relationship between adenoids and middle-ear diseases should be considered, as they may produce only a catarrhal condition of the Eustachian tube or perchance a real occlusion of its inner orifice, and here one sees diminished and impaired hearing. Such a child is often scolded and rebuked for inattention, when in reality the ears are at fault.—Dr. W. G. Harkison, *Jour. Amer. Med. Assn.*

Bending Expansion Arch.—The material for an expansion arch is alloyed and handled to develop a maximum amount of elasticity. This also gives it hardness and considerable brittleness. On account of the latter quality, great care must be used in bending the arch or it will break, especially at the junction of the threaded and smooth parts, and more especially if the threads are cut deeper than they need be, as they are on some of the arches now on the market. To avoid breaking during bending the arch should be bent with the fingers as much as possible. Ordinary pliers make short, sharp bends, with great liability of breakage; round-nose pliers are considerably better.—*Western Dental Journal.*

Purification of Water by Ozonization.—In the *Technical World Magazine* for April there is an article by P. J. Preston on the purification of water by ozonization—that is, by passing ozone through it. Ozone is an allotropic form of oxygen gas, and the oxygen is transformed into ozone by electricity. Ozone is a sort of glorified oxygen which has the properties of oxygen in a vastly heightened degree. It is useful in many ways, but especially as a germicide. It is now being used as a cure for tuberculosis of the lungs, and it has been benefiting people's lungs ever since the creation, as it is generated by the lightning and produces the delightful atmosphere noticeable after electric storms. The use of ozone and electricity in the purification of water is not new. Mr. Preston himself tells of an experimental plant which has been in operation for some time in Philadelphia for illustrating to investigators and students the purification of water in this way. Still, the article is interesting for the particulars it furnishes and

for its illustrations. In the Philadelphia plant a sample of water—the writer does not say how much—containing 700,000 bacteria had not a microbe left after ozonization, and the purification was instantaneous. It is stated that any housekeeper can make ozone by the aid of the electric current used in electric lighting and ozonize all the water needed for household purposes.

COMMUNE WITH YOUR FELLOWMAN.—A dentist may be a good, honest, conscientious man and not be a good citizen. A good citizen is one who not only absorbs all that is possible, but who goes among the community in order that others may be impregnated with his talents of whatever character they may be. Nothing so polishes the intellect as the contact of mind with mind. It awakens in you a consciousness that others know as much and more than you, and unless you expect to fall by the wayside you must crawl out of the rut so well worn and strive for the ideal, which cannot be done single-handed, but by communing with your fellowman and practitioner.—MAX M. EBLE, *Dental Summary.*

MARRIAGES.—R. A. Tate, a dentist of Mercur, Utah, was married to Miss Katherine G. Caffey of Mercur, April 2.—William P. Carroll, a dentist of Granville, Ill., was married to Miss Elizabeth M. Shaw of Sterling, May 23.—M. W. Gouse, a dentist of Warren, Ill., was married to Miss Zella A. Rizner of Warren, May 12.—Ray Kirkpatrick, a dentist of Edgewood, Ia., was married to Miss Elizabeth Barnes of Fairfield in May.—A. G. Clarke, a dentist of Guyman, Okla., was married to Miss Joy Tyson of Alva, May 20.—Glenn Wright, a dentist of Manchester, Ind., was married to Miss Grace Wine of New Carlisle, O., May 10.—Alexander P. Rowe, a dentist of Dephler, O., was married to Miss Emma C. Boden of Winchester, Va., May 13.—D. E. Wilcox, a dentist of Oconto, Wis., was married to Miss Annie Johnson of Oconto, May 14.

DONT'S IN GOLD INLAYS.—Don't use anything but pure gold for your inlays, and be sure it is free from borax and dross. If you want a stronger gold for bridge attachment, use gold alloyed with platinum.

Don't use scrap gold and expect good castings, for it is impossible.

Don't use the crucible in the flask to melt the gold in to form a button. Do this on a piece of charcoal.

Don't overheat your investment, as all the heat required is enough to burn out the wax. Plaster disintegrates at 300 degrees.

Don't fail to use the magnifying glass on the cavity side of the inlay.

Don't fail to remove every trace of investment from the filling.

Don't knock the wax inlay off the sprue wire while investing.

Don't fail to seat and reseat the gold inlay several times before cementing.

Don't fail to charge more for these fillings, for they are worth more, and if you do not ask it you will not get it.

Don't think the machine is wrong and you are right, if you do not at first succeed, for it may be just the reverse of this.

Don't fail to do the best you know how every time.—W. H. TAGGART, *Items of Interest.*

A COMMON ERROR IN DIAGNOSIS.—It seems not to be generally appreciated by dentists that a partly worn cement or guttapercha filling may account for uneasiness in a tooth in which no pulp inflammation exists. Before deciding to remove a filling of this kind, in order to destroy the pulp, or in expectation of any operation whatever being required, try filling with the same material upon the partly worn filling. Often this is all that the case requires. Experience with plastic fillings in my own mouth taught me this. A partly worn cement or guttapercha filling allows of thermal impressions not noticeable so long as the filling retains its required contour or bulk. This wearing of fillings of the kind, with the attendant result of uneasiness in the tooth, is one of the most serious objections to using cement or guttapercha.—FRANK W. SAGE, Cincinnati, O.

HABITS GOOD OR BAD ARE HARD TO CHANGE.—At one time all people believed that the world was flat; a man with scientific instruments and with scientific bent of mind proved to the world that the earth was round, and he was burned for his thought. In the olden days, when men hunted with hounds and horses, buttons were placed on the skirts of their coats in order to keep them out of the way in the rush for the fox, and ever since then men have been wearing buttons on the backs of their coats. These things have clung to us by the tyranny of fashion or force of thought. And so it is in the dental profession. For twenty-five years or more there was the practice of boring in at the gum line to allow the escape of mephitic gases, this practice having been engrafted on the profession, and it took twenty-five years and some laceration of conscience and of method to shake it off. There are some so-called dentists who still practice that method.—C. E. BENTLEY, *Dental Review.*

AN INTERESTING CASE.—The husband of one of my patients, whom I had never seen before, came into my office one day and said he was under the care of a very prominent Jewish physician or surgeon, who recommended an operation on his tongue; but his wife advised him to see a dentist. He came to see me. He ran out his tongue, and on the under side I saw a small warty growth; one might call it a cauliflower growth, but it looked more like a warty growth. I immediately looked for the cause of the irritation. He had not cleansed his teeth very thoroughly and did not take good care of them, and I found deposits on the first and second lower molars on that side, and these teeth were very rough along the edge of the gums. The gums were ragged and sore; and the rough deposit, irritating the lower part of the tongue, caused, in my judgment, this warty growth. That man was ready to have an operation performed; he said it was going to cost him $500 to have it done. The surgeon insisted that the tumor was malignant; that he was liable to lose his whole tongue if the growth was not removed at once. I removed the tartar from the teeth on that side, touched the growth with acetic acid three or four times, so that very soon the tongue was just as smooth as mine is now.—L. L. DAVIS, *Dental Review.*

DENTAL DISEASE IN CHILDREN.—A paper was read on this subject at the recent meeting of the British Medical Association. According to Mr. Edmund Owen, one of the chief causes of dental disease in children is faulty feeding. Mr. Owen further insisted that all advertised sterilized foods are bad for children's teeth, and if a child must be brought up on cow's milk, the milk should not be dealt with in any way likely to destroy that living something which is essential to the well-being of the child. The manufacturer of drugs, the mere tradesman, has of late taken on himself to teach medical men how to prescribe, and the vendor of patent foods dictates to the profession and the public as to how children should be fed, while the profession and the public allow themselves to be led. In his opinion, prevention of dental disease in children is a better study than its treatment, and the so-called "high" civilization of the day is accountable for most of dental troubles.—*Journal Amer. Med. Assoc.*

COLLEGE COMMENCEMENTS.—Chicago College of Dental Surgery, May 26, 68 graduates; College of Dentistry, University of Illinois, May 29, 29 graduates; Northwestern University Dental School, June 1, 160 graduates; Colorado College of Dental Surgery, May 12, 13 graduates; New Orleans College of Dentistry, May 12, 34 graduates; Detroit College of Medicine, May 28, 28 graduates; Washington University Dental Department, May 23, 46 graduates; St. Louis University Dental Department, May 22, 31 graduates; Lincoln Dental College, May 27, 15 graduates; College of Dental and Oral Surgery of New York, May 25, 44 graduates; University of Buffalo Dental Department, May 29, 24 graduates; North Pacific College of Dentistry, May 21, 40 graduates; Ohio College of Dental Surgery, May 7, 40 graduates; Starling Ohio Medical University, May, 30 graduates; Pennsylvania College of Dental Surgery, May 30, 61 graduates; Texas State Dental College, May 11, 10 graduates; Marquette University, May, 25 graduates.

FREE DENTAL SERVICES FOR THE POOR.—In February, 1907, the Children's Aid Society consented to furnish a room in one of its industrial schools for the purpose of establishing a free clinic where dental services could be obtained by the needy poor. A few dentists, who were interested in furthering this service for those unable to pay for it, agreed to give their time and to persuade others to join in the work, if the Children's Aid Society would equip the room and buy the necessary material. This has been done and a staff of about forty dentists has been organized, who serve without pay. Two or three members of this staff are on duty every afternoon except Saturday and Sunday.

The room equipped for this purpose is in a school where about 500 children are taught, at 552 West Fifty-third street. The needs of the pupils here have been so great that they have formed a great majority of patients for the institution thus far, though it is open to the general public.

The service has been divided into classes. The elder and more experienced members are known as consulting dentists, the middle-aged as visiting dentists, and the younger men as attending dentists, the arrangements being

such that there is always an older and more experienced man present with the younger one.

The original stimulus for this clinic came about through the researches of the New York committee of physical welfare of school children. The investigations of this committee seemed to show that between 75 and 90 per cent. of the public school children of New York had diseased teeth. The record of examinations conducted thus far at this clinic proves these figures correct. The record of the first ten months up to January 1, 1908, shows that 555 children have been examined; 2,362 cavities have been found in permanent teeth; 370 cavities have been found in deciduous teeth; 447 teeth have been extracted; 284 fillings have been inserted, including amalgam, cement and guttapercha. Two hundred teeth have been treated, and in many instances after making the root canals aseptic they have been filled, besides much instruction has been given in the care and cleansing of the teeth. Among the 555 patients examined not one has been found who did not need dental services.

When the importance of keeping the teeth and mouth healthy is considered and the neglect of these important organs among the masses is observed, one may obtain some idea of the crying need of such a clinic as this in connection with almost every hospital in the country, and it is to be hoped that there may be a quickened sense of responsibility on the part of the dental profession in this matter and a helpful cooperation on the part of the medical men and such societies, organizations and hospitals as may be able to further the efforts to provide for the dental necessities of the worthy poor.

While these forty men are working hard, the work they can do to alleviate the pressing needs of the people in this direction is but as a grain of sand on the beach.—Herbert L. Wheeler, *Jour. Amer. Med. Assn.*

Public Dental Education.—The committee on Public Dental Education appointed by the Illinois State Dental Society is at work reviewing the literature upon the subject and hopes to have something to offer the members of the Society in the early part of the coming year.

Its report will doubtless take the form of a booklet setting forth in popular language and concise terms some needful things the public should know concerning their teeth.

Among other things will be chapters upon the following subjects:

Care of the Mouth and Teeth.
Mouth Washes.
Diseases of the Gums.
How to Preserve the Teeth.
Motherhood.
Tartar.
Dental Fees.
Crown-and-bridge Work.
The First Molar.
Children's Teeth.

These will be written by dentists who have given some attention to

these special subjects. These booklets will be distributed to members of the society for circulation among their patients as they see fit.

That there is a great need for some effort on the part of the dental profession to educate the public upon these subjects there can be no doubt.

It is a known fact that only twenty per cent of any given community pay any attention to the care of their teeth. The remaining eighty per cent do not do so because they have not been educated to its necessity. The greatest educational impetus that the public receive at present in such matters is through the public press by the advertising "dental parlors" that have no further thought than doing the least and sometimes the worst amount of work for the greatest amount of money. It must be conceded, however, that they are rapidly popularizing dentistry through such media as the public prints, circulars, etc. Persons who have only known of extractions and artificial plates have come to know that the hitherto unknown and inconceivable thing can be done through dentistry, thus saving them the inconvenience of extractions and mortification of plates. But, as I say, this information has percolated from the wrong source, and in a large number of instances has resulted in a serious distrust in the ability of dentists to do that of which they boast. No effort, as far as I know, has been made on their part to prevent the ravages of decay or the disaster of the extraction of the first molar, or a number of other things that make the calling of dentistry a true profession.

If we as a profession have been derelict in this regard in the past, the future should hold no such indictment against us.

The Illinois State Dental Society, foremost in things for the advancement of our profession, has taken a decided step toward dissolving this indictment. These booklets, after careful revision, are to be placed in the hands of the members of the society through its representatives of the component societies.

No names are to appear upon or within the booklet, thereby preventing the man with the advertising mania from taking advantage of his more modest neighbor. It will be issued under the auspices of the Illinois State Dental Society.

In taking this step we are in accordance with the spirit of the times. In medicine, "preventive medicine" is the watchword today. The national legislature has given a blow to dishonest and unprincipled producers of impure foods. In patent medicines, the Public Health Defense League is taking national steps to rid the country of the spurious and worthless nostrums that are offered for sale to a gullible public. This, all of it, is education. Education in the right direction, returning to your fellowman that modicum of the unearned increment that is yours by heritage or superior advantage.

Thus Illinois dentists have caught the spirit, and let there be no lagging, but lend a hand to a work that is much needed in our illustrious state.—Dr. C. E. Bentley, *The Bur.*